INTEGRATED FRAMEWORK FOR DIGITALISATION AND BUSINESS PROCESS REENGINEERING FOR BANKING PERFORMANCE IN SOUTH AFRICAN BANKS

By

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ABSTRACT

People, businesses and the environment are carrying out disruption and transformation as imposed by the fourth Industrial Revolution through adoption and adaptation to the new smart technologies. Financial institutions in South Africa have already been picking up the pace to the digital alignment through automation of banking transactions to ensure performance and long-term development. The current study strives to evaluate the impact of the digitalisation and business process reengineering in improving banking performance in South Africa. In one hand, the theoretical framework emphasised that digital banking performance variables are digital banking strategies, technological innovation, customer experience, digital banking process reengineering and the digital banking framework. On the other hand, the conceptual framework revealed that digital banking performance is also influenced by other factors such as digital project management, systems of systems reengineering, systems' integrations, knowledge-based management and the cyber security and the disaster management. Based on the theoretical and the conceptual frameworks, this study delivers a conjunctive digital banking performance framework to later serves as a model for effective and efficient digital banking implementation. Furthermore, a comparative analysis of the digital banking performances is conducted between SA banks. Both qualitative and quantitative research approaches are used to optimise the quality of the research findings. The SPSS version 26 has been used as statistical tool to analyse digital data collected from respondents. Microsoft Visio Professional helped to design and compared traditional and reengineered banking processes. Results established that digital banking performance variables have a strong, positive and significant relationship among them because the correlation between digitalisation, digital banking process reengineering and the digital banking framework and the digital banking performance is respectively 95.10%, 76.60% and 72.50% while the coefficient of significance is .000 at a significance level of 1%. The comparative analysis between traditional and reengineered banking processes showed a huge gap meaning that SA banks are following a well-structured and well-organised roadmap towards digitalisation. However, SA should be prepared for the behavioural economic since the "Too demanding" customers will design their own products and/or services for the bank to execute them. Digital banking strategies include standard strategies such as the differentiation, market positioning and market segmentation in addition to digital emerging strategies that comprise customer and product-centric, change-driven leadership, security-driven and data-driven. Digital technology innovations include internet of things, banking security, smart innovations, smart devices, data analytics, artificial intelligence,

system architecture. Digital customer experience includes communication channels and the social medias. Based on the biographical profile of respondents, research findings established that age, gender, race, level of education, job experience, job place, SA banks equally affect perception of the importance of the digitalisation of banks. Results revealed that FNB bank is the leader in the SA financial market since they have the highest rate of return on equity of 40% followed by Absa, Nedbank and Standard bank. Besides financial performance, SA banks also achieve strategic, digital, socioeconomic, risk and the environmental performance following specific regulatory compliances. Despite digital challenges such as Fintechs, financial risks, economic recession, dependence to the artificial intelligence algorithms providers and machine learning and the scarcity of the digital skills, the SA government should ensure economic and financial stability as well as the supremacy of the humankind. Nowadays, the pandemic of the Corona virus has become another factor that severely decrease shares' value in the financial market leading to the decrease of economic growth. The current study proposes a framework that includes digital banking performance variables, the digital banking performance types, digital banking challenges, digital system innovations, digital BPR management, digital banking disaster and the digital disaster management model. Additionally, the study conceived a digital financial service delivery model that illustrated phases to follow at each stage of the DBP transformation. The digital financial service delivery model contains seven phases such as growth opportunity, collaboration, design and simulation, implementation and development, fully digitalised, digital support and the global/National change.

Keywords: Digitalisation, Business Process Reengineering, Banking, 4IR, Performance, South Africa, Digital financial service delivery model, Conjunctive Framework

CERTIFICATION OF THE DISSERTATION

I, Genevieve Bakam Fotso hereby degree that the subject matter of the dissertation entitled "Digitalisation and Business Process Reengineering for Banking Performance: A Perspective of South African Banks" hereby submitted by me in partial fulfilment of the requirements for the degree of Doctorate Technologiae in Quality and Operations Management in the faculty of Engineering and Built Environment (FEBE) at the University of Johannesburg (UJ).

The present document is my original work which has not been submitted to any other institution for a purpose of awarding a degree or published in academic journals. I therefore grant copyright of the thesis in favour of the University of Johannesburg (UJ). Most importantly, work of other authors used in this dissertation have been properly acknowledged and referenced.

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DEDICATION

I dedicate this Doctoral thesis to the God almighty and to my lovely children: Kelvin, Christiane, Darene and Hans.

DECLARATION

In presenting this report in fulfilment of the requirements for a degree at the University of Johannesburg, I agree that permission for extensive copying of this report for scholarly purposes may be granted by the head of my department or by his or her representatives. It is understood that copying or publication of this report for financial gain shall not be allowed without my written permission.

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EXECUTIVE SUMMARY

Considering the importance of the fourth industrial revolution (4IR) in the world, the current study chooses to research on the impact of such revolution on the performance of South African banks. Based on the limit of the literature review, this study comes up with a conceptual framework that talks more about the large spectrum of factors that influence performance of banks. Data collection and analysis showed that the following business factors are to be well-managed to optimise banking performance in South Africa.

- Digitalisation – Digital strategies
- Digitalisation – Digital technological Innovations
- Digitalisation – Digital customer experience
- Digital Business process reengineering
- Digital banking performance conceptual framework

Profound analysis of the published annual reports revealed that South African banks do not only play their natural role of financial intermediaries, but they also contribute to all aspects of the country development. In doing so, South African banks partner with other entities of the government to enhance their participation in the sustainable development. Below are the diverse parts of the performance raised by South African banks:

- Financial performance
- Digital innovation performance
- Strategic performance
- Socio-economic performance
- Eco-friendly and Environmental performance
- Risk and Capital Management performance

Based on research findings and financial data audited by the SARB and published by the South Banks, the study designs the following framework and models that can guide and optimise results of SA banks in their journey towards the stage of fully digitalised bank.

- Digital banking performance conjunctive framework
- Digital banking disaster and the digital disaster management model
- Digital banking performance stages
- Digital financial service delivery (DFSD) model

LIST OF ACRONYMS

Abbreviations	Description
4IR	Fourth Industrial Revolution
AI	Artificial Intelligence
B-BBEE	Broad-Based Black Economic Empowerment
BPM	Business Process Management
BPR	Business Process Reengineering
BSM	Banking Security Measures
CDA	Cloud Domain Architecture
CIB	Corporate Investment and Banking
CSIR	Council
DCE	Digital Customer Experience
DCM	Digital change management
DDMM	Digital Disaster Management Model
DFSDM	Digital Financial Service Delivery Model
EI	Emotional Intelligence
FINTECH	Financial Technologies
FTSE	Financial Times Stock Exchange
GDDR	Global and Sustainable Development Requirements
ICT	Information, Communication and technology
IDV	ID Verification
IFRS	International Financial Reporting Standards
IoT	Internet of Things
IT	Information Technology
JSE	Johannesburg Stock Exchange
KBM	Knowledge-Based Management
LRA	Laws Regulations and Acts
OECD	Organisation for economic co-operation and development
RBB	Retail Business Banking
SA	South Africa

SARB	South African Reserve Bank
SER	Socioeconomic and Environmental Requirements
SME	Small, Medium Enterprises
SoS	System of Systems
SWOT	Strengths, Weaknesses, Opportunities and Threats
UJ	University of Johannesburg
WIMI	Wealth Investment and Investment Banking

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LIST OF DEFINITIONS

Aerobotics: Aerobotic is a type of technological innovation application that farmers use to optimise agricultural crops through detection of early-stage problems and release tree crop analytics. Example of Aeroview scout App (Siemens, 2017).

Airware: Airware is a digital company that create and provide drone analytics, cloud computing and machine learning among others to assist business in leveraging their technologies for business restructuration, productivity increase, risk mitigation and safety (McKinsey Global Institute, 2017)

Architecture Domain: An architecture domain is a large view of the enterprise systems. Business, data and application architecture respectively represent the structure of the business, data and applications systems or applications in use (Oracle, 2018).

Artificial Intelligence (also called machine intelligence): is a branch of computer science and engineering that builds smart machines that perform tasks that require human intelligence such as speech recognition, visual perception and decision making (Deloitte, 2015).

Automation: Automation is the process of replacing human workforce by electronic devices, scientific knowledge and intelligent machines to increase productivity and efficiency.

Behavioural economics: is the analysis of cognitive, social, emotional and cultural factors associated to an individual or society in the decision making behind an economic outcome for example the sale of a product (McKinsey Global Institute, 2017).

Big data management: Big data management is the process of analysing, extracting information and managing complex data from different sources at a higher level compared to traditional data-processing software (Accenture, 2018)

Big data: A generic term that designates the massive volume of data that is generated by the increasing use of digital tools and information systems (Siemens, 2017).

Cloud computing: An innovation in computing that allows for the use of an online network ("cloud") of hosting processors so as to increase the scale and flexibility of computing capacity.

Cloud computing has made possible the analysis of very large datasets (big data), and a number of specific FinTech applications (FNB, 2019)

Crowdfunding: Equity and loan crowdfunding is the practice of funding a project or venture by raising monetary contributions from many people. It is often performed today via internet-mediated registries that facilitate the money collection for the borrower (lending) or issuer (equity). See also online FinTech lending (McKinsey Global Institute, 2017).

Cryptocurrencies: "A cryptocurrency is a type of currency which uses digital files as money. Usually, the files are created using the same methods as cryptography (the science of hiding information). Digital signatures can be used to keep the transactions secure, and let other people check that the transactions are real" (McKinsey Global Institute, 2017).

Cyber Security: Cyber security together with computer and IT security represent the protection on computer and networks systems from the fraudsters' attacks and mostly from damages, disruption or misdirection of the services to be provided (McKinsey Global Institute, 2017)-

Data Analytics: Data analytics is the science of analysing and interpreting raw data to support current and future decision-making (Absa, 2019).

Deposit and refund scams: in this case, fraudsters answer to your advertisement by pretending that they already transfer the money and request delivery of goods. Later on, you realised that the receipt s, deposit slip or internet payment approval were fake (FNB, 2019).

Digital currencies: These include private currencies, such as Bitcoin, Ethereum, Ripple and Litecoin, and digital versions of national bank currencies. Because of the use of cryptography techniques, a (large) subset of digital currencies are referred to as "cryptocurrencies." (Siemens, 2017).

Digital ID verification: A range of technologies used to confirm the identity of actors in financial transactions or other applications, e.g. to prevent fraud and to ensure the security of clients and counterparties (FNB, 2019).

Digitalisation: Digitalisation is the process of integrating digital technologies to improve life and business transformation. It is the process whereby raw data or information (sound, pictures or text) is converted to digital format; a format that computer and machines can understand and work with (Oracle, 2018).

Dispel: "Dispel makes cloaking technology, rendering networked infrastructure and endpoints invisible and segmented, stopping attackers from gaining actionable knowledge usable in a cyberattack. Dispel cloaking is a secure overlay network in which applications can be deployed, or around which infrastructure can be concealed. They accomplish this cloaking through network-level Moving Target Defence: an orchestrated mass-virtualization and encryption technology designed to disrupt attacker's operations. An offensive, moving target defence stops attacks well ahead of older technologies." (PWC, 2017).

Emotional intelligence: It is the capability of people to identify their own emotions and those of others and use it to guide thinking behaviour and adjust emotions to adapt in any environment and achieve required goals. Emotional intelligence is complementary to the emotional leadership and emotional quotient (PWC, 2017).

E-Trading: A broad category of financial market trading methods on electronic trading platforms and virtual marketplaces. This can include algorithmic or high-frequency trading among professional investors, and online investment, "social trading" or "copy trading" among retail investors (PWC, 2017).

FinTech: Technology-enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on the provision of financial services (Oracle, 2018).

Hologram: is the refraction, display or projection of an object in three-dimensional space using diffraction of light patterns (Siemens, 2017).

Internet of Things: IoT is a digital platform that allows deployment of the smart technologies such as sensors, software and network connectivity; collection and exchange of data; receive, send and execute commands; efficiencies, cost savings and revenue increase (Absa Africa, 2019).

LifeQ: "LifeQ implements a unique multidisciplinary approach underpinned by in-depth knowledge and understanding of human physiology and systems biology to extract and deliver relevant and meaningful person-specific digital biomarkers from various curated data sources. They are a world-leading science and technology company that want people from all walks of life to enjoy optimal health" (Oracle, 2018).

Machine learning: is the process where a computer or machine is taught through algorithms that improve automatically to make accurate predictions using the data given. It is a subset of artificial intelligence (Absa Africa, 2019).

Magnetic levitation: It is a phenomenon where an object or entity is suspended in air using magnetic fields only (Siemens, 2017).

Mobile and web-based payments: Applications that allow consumers to conduct transactions through their mobile phone or tablets, improving efficiency and the customer experience (Oracle, 2018).

Money laundering: this happens when drug dealers, smuggling, human trafficking come out with silly reasons and offer you to deposit money into your account for few days since they cannot justify the real source of the money (PWC, 2017).

Nanotechnology: It is a field of innovation and research that deals with the construction and invention of devices or any material on a molecular scale (Oracle, 2018).

Neurotechnology: It is a branch of technology that deals with the understanding of the brain, thought processes and consciousness (PWC, 2017).

Robo-advisors: Applications that combine digital interfaces and algorithms, and can also include machine learning, in order to provide services ranging from automated financial recommendations to contract brokering to portfolio management to their clients. Such advisors may be standalone firms and platforms or can be in-house applications of incumbent financial institutions (McKinsey Global Institute, 2017).

Robotics: Robotic is an interdisciplinary research area at the interface of computer science and engineering. Robotics includes conception, construction, operation and the use of robots. Robotics allow to design intelligent machines that can help and assist human being in the daily lives (McKinsey Global Institute, 2017).

Sentiance: "Sentiance analyses sensor data to understand human behaviour and context so clients can develop new products and services that turn the Internet of Things (IoT) into the Internet of You. Sentiance context intelligence enables solutions for lifestyle-based insurance, contextual marketing and commerce, smart mobility, connected health, smart home, smart city and connected car" (McKinsey Global Institute, 2017).

Smart contracts: Programmable distributed applications that can trigger financial flows or changes of ownership if specific events occur (Absa Africa, 2019)

Social trading: A range of trading platforms that allow users to compare trading strategies or copy the trading strategy of other investors. The latter is often referred to as "copy trading" or "mirror investing." (Absa Africa, 2019).

Tokens: Any digital representation of value. There is often a close relationship with digital identification verification for information security purposes (PWC, 2017).

Trueface AI: "Trueface computer vision solutions augment any existing camera feed into intelligent, actionable data capable of identifying persons-of-interest, objects and more. Trueface AI provides facial recognition and spoof detection solutions for clients of all sizes. It provides an API, on-premises solution and a no-code solution for identity management. The Trueface mission is to educate on the benefits of computer vision and make it accessible for businesses looking for more unique and secure solutions" (Siemens, 2017).

Virtualisation: It is the process of creating virtual version of computer hardware platforms, storage devices and computer network resources (Siemens, 2017).

Wasteless: "Wasteless is the world's first machine-learning solution with real-time tracking for grocery stores looking to offer customers dynamic pricing based on a product's expiration date. Wasteless takes machine learning capabilities used online and brings them to Brick and Mortar outlets. Tracking products at the item level, automating manual processes, and applying dynamic pricing have been the foundation of successful e-commerce platforms enabling them to substantially increase their profits. Wasteless allows supermarkets to close the gap and compete in the digital era" (Siemens, 2017).

Whaling: This is a type of phishing scam whereby fraudsters pretend to be a top manager of the businesses well as financial institutions and request money transfer to an external account (FNB, 2019).

What3Words: "What3Words is a universal addressing system provides a precise and incredibly simple way to talk about location. They have divided the world into a grid of 3m x 3m squares and assigned each one a unique 3-word address. Better addressing can enhance customer experience, deliver business efficiency, drive growth, and support social and economic development. It was the first system designed for voice and human interaction with machines" (Siemens, 2017).

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CHAPTER ONE

INTRODUCTION AND BACKGROUND

1.1 Introduction

The current dynamic world is growing with exponential speed of change that needs to be carefully well-managed for companies that want to go far. Increase in smart technologies forces companies to be up-to-date and to readjust their business tendencies in order to adapt and survive in the volatile environment. The question is about how to deal with business speed while maintaining quality on service delivery? Solutions stand on developing new strategies in alignment with the organisation's goals. With the advent of digital disruption through improvement of artificial intelligence, internet of things, mobile technology and robotics, economic industry and its business operations are completely reshaped. The emergence of digital era leads to the fourth industrial revolution that gives new orientations to organisational change and new business developments. Oracle (2018) showed a big increase on retail sales through e-commerce as well as a decrease on newspaper print and global music market because the growth is online. According to Deloitte (2018), digitalisation involves networking by means of internet of things, service, data as well as people that are the key elements that will completely transform the future of organisations that operate across local and global markets. Since the new digital tendency is global and universal, companies should not ignore the impact of non-global alignment on their business. This suggests that it is no longer a choice but the only way going forward. Optimisation of digital performance drive organisations to go beyond border to global positioning. Local and international regulations are thus put in place to protect both companies and customers from the negative sides that come with the use of new smart technologies. Competition awareness helps organisations to be ahead of change and set up relevant solutions to manage related risks.

The 21st century is marked by a strong digital revolution that redefines relationship between banks and their customers. The digital age is also marked by the so-called millennials who are the people born during internet generation who seek for improved services to ease their lives. Digital natives focus on the experience that they gain through use of upgraded technologies whether from their banks or from the competitors and not sustaining loyalty towards business relationship. In fact, continuous change and increase on customer expectations drive banks to

be closed to the customers to collect their future needs and secure market positioning before other competitions. Fintechs for example are non-traditional financial competitors that focus on cutting-edge services not offered by banks and further design light structures to provide services in a better way (Deloitte, 2018). The truth is that digital natives have different taste compared to the old generation.

Digital transformation is the biggest event that the world has faced during the last three decades affecting both small and big companies as well as South African financial institutions. The question is to find out if South African banks are ready for digital transformation. Currently in South Africa, banks are making efforts to successfully embrace digital improvement and meet the goal of the "Bank of the future" (SARB, 2018). Although South African reserve bank develops guidelines and financial structures to govern banking operations, emerging markets and traditional players that have an unmeasurable impact on digital migration. According to IDC (2018), South Africa as a country is still at a formative stage of the adoption of internet of things (IoT) applications, artificial and emotional intelligence among others smart technologies. The country has at least marked a first step towards the digitalisation trajectory compared to other African countries that are not even aware of the change. Let us acknowledge the fact that financial and technological innovation hold a potential of driving fundamental change among banks and financial institutions. Compared to other advanced technologies such as gamification, mass customisation, crowdsourcing, and collaborative consumption, digitalisation also comes with advanced computing and big data capabilities (Oracle, 2018). However, adaptability to digital transformation will still remain a burning issue in years to come due to the volatile environment and the resistance to change. In addition to Oracle (2018), PWC (2018) argued that among exponential technologies such as biotech, new energy & sustainability, nanotechnology and robotics, ICT and mobile technology remains the core transformation that leads to digitalisation.

Digital by means of intangible historically refers to the use of numerical digits. Digital enterprise is characterised by four elements namely connection, intelligence, agility and social (Beziade & Assayag, 2014). Digital transformation is a process or transition by which people, organisations and enterprises embrace and incorporates digital into their business model, strategy and interaction with both internal and external stakeholders (Beziade & Assayag (2014). From globalisation to digitalisation, financial sector has permanently changed their ways of doing business to remain ahead of change and to limit negative impacts from the global economy. As a matter of urgency, the global emergence of internet technologies constitutes a

threat for all organisations that are not picking up the pace on time. The higher market demand of smart ICT devices raises a question about the impact on the environmental sustainability. At a first sight, promise of green ICT and ICT for green constitutes a serious concern related to digital transformation.

The fourth industrial revolution (4IR) can also be called age of the customer in a sense that business focus is on customer experience/intelligence, interaction, and satisfaction. According to Dunleavy, Margetts, Bastow and Tinkler (2005), being ahead of managing customer experience has become the bridge through business growth at every level of the economy sector. Since business profitability goes in hand with customer satisfaction, South African banks continue to deploy effective business mechanism to be at the forefront of customer care. The use of technologic innovations has boosted the leveraging of business process management. This suggests that traditional business processes have been transformed to become reengineered business process that are easy to be digitally processed. South African have been using digital omni-channels such as the online banking and bank Application to redefine banking transaction processes. Such transformation requires a well-planned change management to improve digital culture and limit resistance to change.

Banking performance relies on the level of digital restructuration happening at the bank. Instability of the macroeconomic, political, and social environment equally affect digital evolution in South Africa. Regarding the critical role that banks played as intermediary in the economic market, their performance enhancement is capital for growth. The oligopolistic nature of the South African financial market gives more opportunities to the big four banks namely Absa, FNB, Nedbank and Standard bank. Furthermore, the government has put in place several regulations, laws and Acts that rule the financial sector with the objective of enhancing financial profitability.

1.2. Digitalisation

1.2.1 Digitalisation as a Global Concept

The concept of digitalisation denotes transformation from manual to numerical stage through automation using internet of things. An organisation or company that becomes digital only automate a portion of the business activities whereas an organisation focusing on digitalisation has an objective of transforming the entire business. According to Sabbagh, Friedrich, El-Darwiche, & Singh (2013), digitisation Affects Company's functions namely business, go-to-market, production, and operations in different ways as follows:

Business: Digitisation redesigns existing business models and open barriers to new entrants in the market

Go-to-market: Digitisation rapidly changes companies' brands and products, communication, and delivery channels to their customers.

Production: Digitisation brings manufacturing companies to create products following new production technologies such as 3D and robotisation

Operations: Digitisation has changed how enterprises organise and manage resources seeking for optimisation and efficiency through digital outsourcing

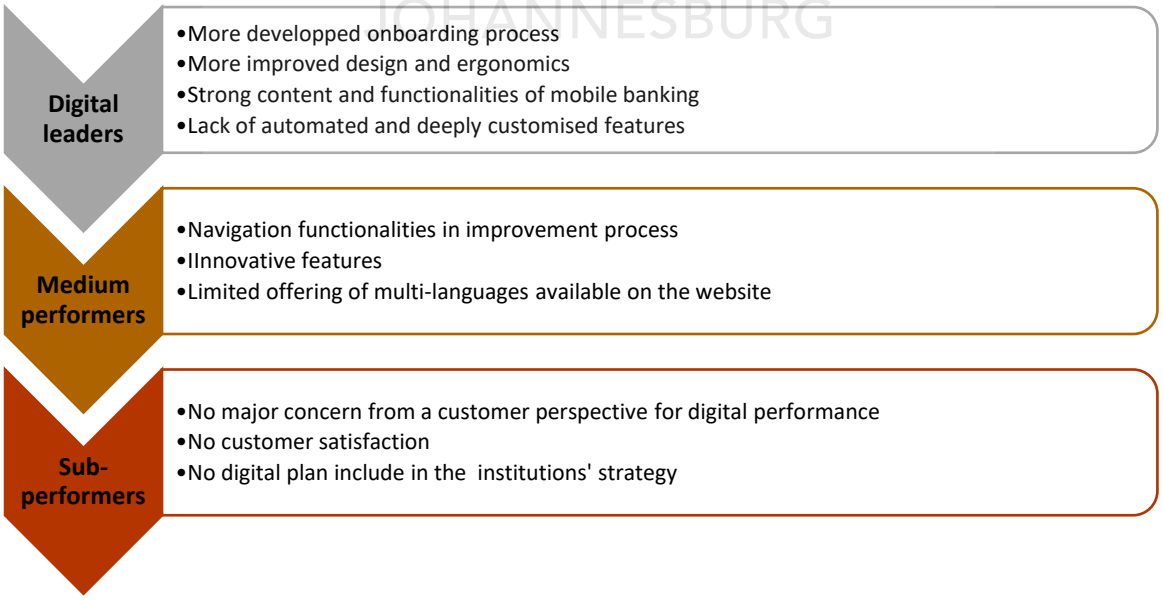
Sometimes, the concept of digitalisation and digitisation are used interchangeably yet they have different meanings. Digitisation defines the method by which other form of representations are changed into a digital form. For instance, converting picture, audio, and music into a digital form. Requirements of the digitalisation is aligned with the concept of globalisation in a sense that with digitalisation, people and business come together wherever they are through remote communication and business systems using internet of things. Fitzroy (2001) defined globalisation as "a worldwide drive towards a globalised economic system dominated by supranational corporate trade and banking institutions that are not accountable to democratic processes or national governments". This suggests that any of today' management should consider the impact of globalisation in their business plans.

Shrinking of economic barriers and the flow of resources across local boundaries has become a threat that any company can turn into an opportunity in the current dynamic world. Economic conditions such as saturation of local market, availability of resources and economy of scale bring companies to become global (Smith, 2001). Mostly, on-time delivery of instant service through technological innovation is the good aspect of the globalisation and the digitalisation. It happens that challenge of lack of infrastructures, educational level, language barriers and political instability in foreign countries can be a bottle neck to the global expansion. Globalisation refers as well to open systems that are inter-related beyond boundaries involving national and international environment through influence of new and smart technologies. Same as millennials or digital natives, internet of things, artificial intelligence, robotics, hologram, 3D printing, data analytics and cryptocurrencies among others are the naming that have arisen with the event of digitalisation as collected from the google searching tool (McKinsey Global Institute, 2017). These naming in convention have been used throughout the report.

1.2.2 Digitalisation in South Africa

In South Africa, organisations are crossing the developing phase on the digitalisation process because the country has a high-quality of mobile broadband infrastructure despite improvement still required in specific rooms (Siemens, 2017). This suggests that South Africa as a country stands on the established level of the digitalisation process. Some industries such as technology, medias, retail, financial services, education, and Telecom are more affected by the digital disruption than others (McKinsey Global Institute, 2017). Digital storm is caused by multiple innovations happening in many economic sectors such as financial services, retail, manufacturing, hospitality, healthcare and so on at the time.

Digital technologies enhance innovation through new combination of existing production factors (Schumpeter, 1934). This entails that innovation is only about a different way of combining production factors or services not yet explored. Smart technologies enable and transform traditional artefacts by making them traceable, communicable, and programmable (Yoo, 2010). Despite the impact of digital disruption on business reshaping and radical change, organisations are aware of the need and importance to become digitalised. Roadmap to digital success reveals that many organisations as well as financial institutions move at different speed depending on their core business and the related technological requirements. Study conducted by Deloitte (2015) regarding digital benchmark in Luxemburg specifically revealed three types of digital performers namely leaders, medium performers and sub-performers as depicted on the figure 1below.



Source: Deloitte (2015)

Figure 1.1: Types of digital performers

Key attributes to measure the digitalisation index may differ from one country to another. For instance, Booz and Company (2017) argued that ubiquity, reliability, affordability, speed, usability and skills are the perfect key attributes to measure the digitisation index:

Ubiquity: it measures the extent to which consumers and organisations have easy access to digital services, applications, and devices.

Affordability: it measures the extent to which people can easily afford to pay for a digital service

Reliability: it measures the quality of accessible digital services

Speed: It measures how digital services can be accessible in real time

Usability: It measures the ease use of digital services by end users

Skill: It measures the ability of users to easily incorporate digital services into their daily lives and businesses

Digital era in South Africa is characterised by the change in demand through consumer habits and in supply through new unexpected competitive fields as highlighted by Azard et al. (2016). Digital technologies involve mobile devices, social medias, cloud computing, data analytics and process digitisation all in a mature stage. The march of digitalisation started with the internet of things, shift to mobile, data explosion and rise of social technology. Such innovation requires robust, secured, and optimised solutions able to meet expectations of empowered and tech-savvy customers known as millennials. Matured online players such as Google, Apple, PayPal, Facebook, Amazon, and others technology-driven start-ups platforms has significantly contributed to the customer knowledge (Accenture, 2018).

Shifting of data into the virtual cloud is another big aspect of the growing convergence of information and communication technologies (ICT). In South Africa, the creation of Fintech constitutes a higher spectrum of competition against existing financial institutions. Fintech is a term used to describe modern, advanced, and internet-based technologies that enable or provide financial services in the financial sector just like common financial institutions. Organisations in South Africa possess tremendous values that are sometimes not known or complete trapped in the business, in the value chain and also in the emerging value chain as argued by Accenture (2018). Well informed companies have been using the digital

technologies as driven force to unlock trapped values and rise additional values based on customer expectations. Digital wallets provide a method of making payments electronically by reducing transaction costs (Financial stability board, 2018). Examples of digital wallets include the following:

PayPal – PayPal allows customers to pay for goods at online checkouts, by triggering card payments or direct transfers from linked bank accounts. PayPal also offers pre-funded transaction accounts, which customers can use to pay.

Apple, Android and Samsung Pay – These allow customers to use their phone to trigger contactless payments from linked credit or debit cards to merchants at physical and online checkouts.

Alipay – Alipay is China's leading service provider to online retailers and digital wallet. Customers can pay for goods on Alipay using pre-paid balances or a linked bank account.

M-Pesa – M-Pesa is a mobile-based digital wallet, which allows users to exchange pre-loaded phone credit balances that effectively act as e-money. M-Pesa began in Kenya and has since been adopted in a number of other countries in Africa and elsewhere.

1.3 Digitalisation and Banks in South Africa

Since 1960s, banks started with the use of automatic teller machines (ATMs) and the introduction of technology in the financial system. At that time, technology adoption was taking place at a very slow pace due to the level of internet acquisition. From the beginning of the 21st century till now, the increase of internet functionalities and the use of smartphones and devices has led to a rapid rate of digital transformation. Such improvements consequently enabled banks to develop mobile banking as well as the creation of digital product and services. Observations showed that digital transformation especially the use of online banking makes things easy for both the banks and the customers (Accenture (2018) and McKinsey Global Institute (2017).

Although South African banks has embraced the digital change to improve productivity, the digital market also raised new and independent financial services providers such as Fintech, Discovery, Bank zero and TymeDigital competing with banks in the financial market. In February 2018, the SARB created a Fintech (Financial Technology) programme to supervise Fintech developments and define appropriate framework to stabilise the financial market. With such competitions, customers have developed some knowledge around their needs and

expectations through customer experience factor. Contrary to the traditional banking approach, digital banks must not only count on customer loyalty but also must increasingly innovate and remain ahead of the customer expectations to gain market positioning.

Digital advancement through technological innovation improves financial services through expansion of new banking service delivery such as internet banking, digital payment platforms and mobile banking application besides update of automated teller machines called ATM. Additionally, new financial models such as electronic money models are developed to improve implementation of new products. This suggests that investments on IT upgrade is the key element for digital transformation through digital channels that include ATM, internet mobile smartphones, chips, tablet, and phablets.

According to Pooja and Singh (2010), banks in Europe, Asia and America spent over $241 billion on IT investments in 2017. They classified internal purpose of IT investments that include investments for risk management, regulatory, business models and productivity compared to the external purpose that only focus on digital financial services. According to the statistical reports of the information society (ITU) published in 2016, there are almost many mobile-cellular subscriptions as people on earth and almost all area will be having mobile cellular signal for better connectivity. They predicted that by the end of 2021, over 2 billion of users will have used their devices for banking purposes compared to only 1.2 billion in 2016 globally. This suggests that connectivity enables financial services access that in his turn bridge out poverty at a certain extend.

All economic industries in South Africa including financial aspects are affected by the change occurring in the global market. Banking sector is more influenced by such rapid change aligned with the use of internet of things compared to other industries due to the pivotal role that banks plays in the overall economy. Transforming financial services is also about getting ready to move with speed and to put in place agile and efficient business model for long term survival. Beyond IT infrastructure and architecture renovation that improve financial service delivery, banks need to reshape internal business approach to get aligned with change. Digitalisation additionally improves risk management through well-defined operating model that optimise cost and efficiency. Nowadays, South African banks deploys strategies to interact with customers by defining end-user computing environments or portal and networking services. South African banks offer both wholesale and retail banking with services such as corporate banking, private banking, business solutions and internet banking. Although Malhotra and

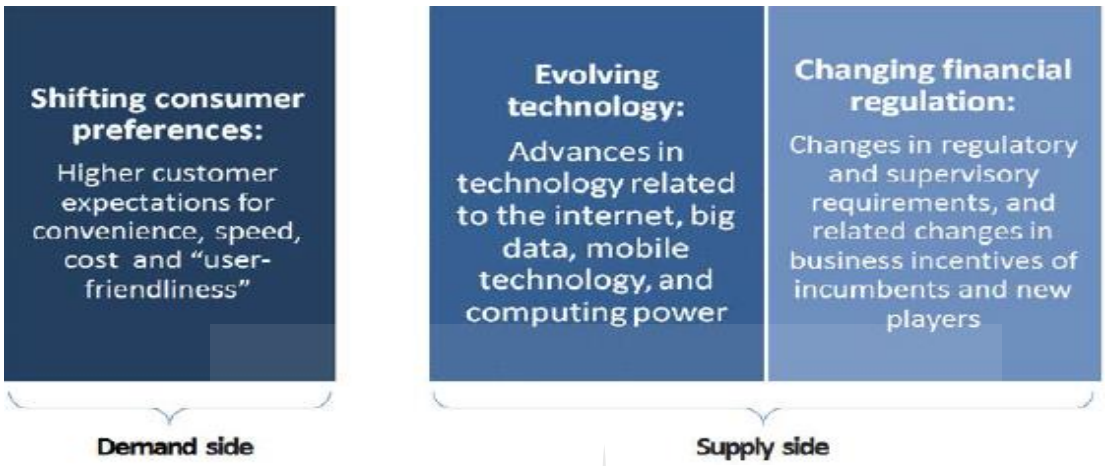
Singh (2009) argued that internet banking does not affect bank profitability and customer' risk profile; evidence showed that customer satisfaction improves the bank' portfolio and growth. Increase on information and technology is regarded as one of the critical key enablers of system innovation at the banks.

Each South African bank offers internet banking and has application to improve secure banking transactions. Financial services require standards through splintering. In fact, Organisations now rely on consumer feedback through social medias to upgrade their products and brands. Some company like BMW offers a build-your-own-BMW online service to achieve customer' satisfaction. Consequently, web channel is seeing as the source of disruptions that forced companies to create products and services tailored to unstable customer's tastes. From digital banking to digital finance or financial services, banks have move on to be up to date in terms of technology upgrade. Banks now work to achieve the objective of "digital became a key part of customer experience". Digitisation has become a main objective for many banks that want to grow. South African banks have brought innovations such as mobile deposits, mobile wallets, branch-less banks. Customers expect to stop long hours banking and bank wherever and whenever. As part of the change, banks are now going towards the customer and not the opposite as before.

1.2.4 Digital Drivers

The roadmap to digital transformation is flooded by digital threats coming along with digital change influencing commercial banks. Technological disruption of banks' value chains, block chain as well as risk of commoditisation constitute major threats that banks must overcome in order to survive (GTB, 2018). In fact, block chains are systems that allow transactions to be done without any verification by a central, controlling authority or bridge company. The risk associated with commoditisation is that traditional method of payment across borders via specific payments provider will be disrupted by digital currency network provider as well as personal finance companies through which the payment will be cleared in a real time at low-cost (GTB, 2018). This entails that digital blockchains are more difficult to manage than Finctech institutions. Transformative impact of digital technology and innovation IT have given opportunity to delight customers by accelerating the digitalisation of business processes to drive business value. According to Broy (2018), digital change is characterised by the following elements namely digital technology, infrastructure, application, business models and change of individuals' behaviour. Change of these elements or instruments also change the entire business, hence the necessity to reengineer the overall business process in the

organisation (Latour, 2009). Well-structured digital banking combines both benefits on the outside from customer experience and on the inside from an efficient and effective operating model all enabled by the digitization and the underlying technologies, processes and technological infrastructures (Atkearney, 2018).



Source: Atkearney (2018)

Figure 1.2: Drivers of financial innovation

Impacts of business reshaping is due to transformation brought by the digital era that involves shifting of customer preferences on the demand side, evolving of technology and change of financial regulation on the supply side Atkearney (2018). This suggests that market equilibrium in meeting business performance can only be met when the level of supply matches the level of demand. Observations showed that banks as well as non-financial institutions first care about customer behaviour and preferences.

Implementation of digital requirements fully depends on internet connectivity. Therefore, internet providers have a critical role in completing the fourth industrial evolution. The following internet providers operate in South Africa.

Huawei's cloudFabric: Successful digital revolution relies on how fast data can be transmitted while analysing big data, keep connectivity up, and running through modern network that can adapt to any situation. Huawei has created a cloud datacentre network solution that promotes solid datacentre networks and ultra-broadband connectivity for the current and the next generation (Huawei, 2019). In South Africa, Mustek and Huawei organisations have partnered to develop a broad-spectrum solution that meet financial services as well as telecommunications needs (Mustek, 2019). They argued for better results, successful management of big data depends on energy systems that required services such as modular

datacentre implementation service, UPS cutover solution implementation and equipment room evaluation services.

Dell EMC: Dell EMC solutions deal with data protection through use of virtual machines and hypervisor beyond VADP to manage difficult environment with a high change rate application (Dellemc, 2019)

MTN: MTN has developed strong link to mobile financial services and digital solutions to improve accessibility, affordability, and connectivity in addition to assuring sustainability strategy through success and expansion (Mtnbusiness, 2019). MTN manages 45 datacentres across the country and in the middle east that offer fast Internet of things, scalable cloud, unified communications, security as a service, network management and security (MTN, 2019).

BCX: BCX is one of the leaders in ICT and telecommunications in South Africa offering and implementing digital transformation in companies of all sizes to optimise productivity and efficiency (Bcx, 2019). They also offer cloud-based services and data centre.

IBM: Known as an international and innovation organisation, 97% of the world largest banks use IBM products to manage their financial transactions (Ibm, 2019). Additionally, "90% of global credit card transactions are processed on IBM mainframes" (Ibm, 2019).

Microsoft: In South Africa, cloud migration is mostly handled by Microsoft azure following applications, data, infrastructure and architecture requirement (Axiz, 2019)

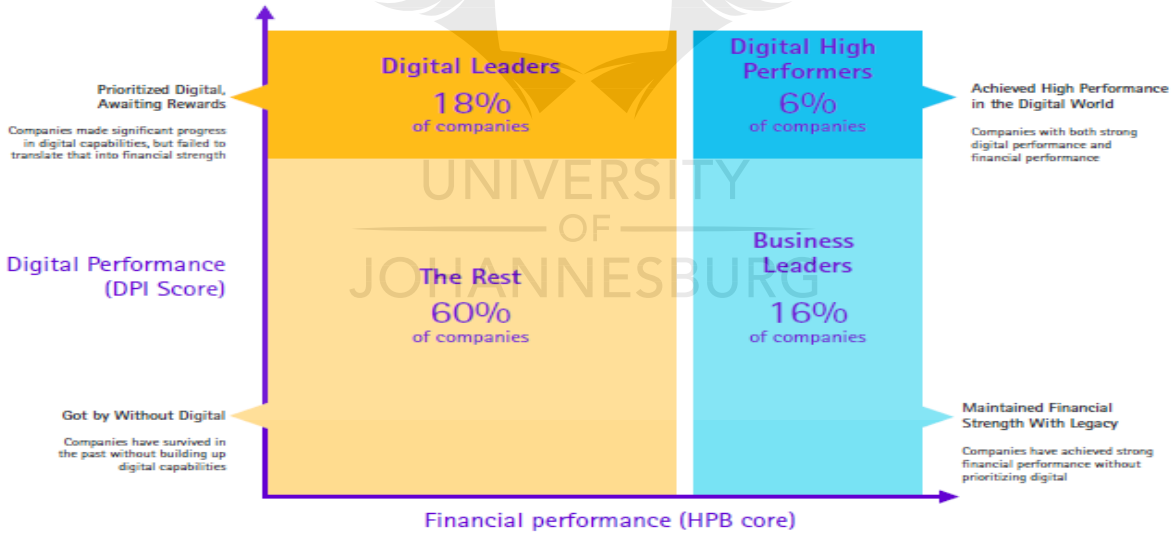
Telkom: Ensuring wireless coverage to improves business and stakeholder connectivity at any point in time. Telkom has defined two lines of package hardware in a box namely business in box – advance and business in box – Supreme to assure machine transaction with higher speed internet (Telkom, 2019).

1.3. Business Process Reengineering

It is important to note that digitalisation elements have different implications on the enterprise depending on which stakeholders is involved. Beziade and Assayag (2014) studied the impact of digital on banking professions and classified digital aspect to be external through network implications, internal through impact on the employees and business process or central through impact on technological partners and the ecosystem as a whole. They found out that the emergence of digital change would affect back-office manager, customer advisor and branch director professions due to the change of customers' behaviours, new payments methods, new entrants in the banking sphere and mostly transformation of retail banks. Muhammed, Gatawa

and Kebbi (2013) argued that for financial companies to survive in the global competition, they should focus on developing new products and services; enhance employee competence and operating models while implementing a corporate culture that ensures commitment towards digital expectations from the customers.

Accenture (2018) published a business review on how to achieve digital performance while managing the rotation time to the new tendency. They believed that it is not just about joining the run but defining time optimisation and the long-term implications on the business performance. It is important for businesses to know whether to use digital technologies to upgrade current services or to use it to unlock new sources of value and productivity. Although the two methods seem to be similar, their scope is different over time. One is applied for short-term efficiency and the other for long-term sustainability and survival. The Accenture digital performance index showed that 60 % of 343 companies have not yet been committed neither on digital nor on financial performance. 18% of 343 companies have made sufficient investments to be listed as digital leaders Accenture DPI (2018). Figure 1.3 below gives more detail per digital categories.



Source : Accenture DPI (2018)

Figure 1.3: Digital versus Financial performance

1.3.1 Change Management

It is important to note that change does not always mean in a positive way. A modification of situation or state of something constitute a change that can rather deteriorate or cause progression. So, change should clearly plan to meet positive incomes and thus avoid

obsolescence and competitiveness. Process of change should be clearly communicated with all stakeholders involved to develop coalition, collaboration, and commitment. In fact, people need to support the change through organisational culture change. Over time, internal resistance to change has brought companies to rather hired external people to run change implementation to ensure credibility of the new process design. However, evidence showed that outsiders might be aware of the reality on the ground and encountered hostility from workers. According to Smith (2001), change can be the fruit of a company or environmental change and resistance to change can be direct or indirect affecting the contents or the process to be implemented. At the corporate level, top management manages planned changes such as internal, core business and business changes compared to customer experience and digital disruption. Smith (2001) could relate whatever the type of change chosen by an organisation, organisational development techniques used to problem solving, structure changing and behavioural change as state. It is important to note here that business process reengineering is part of the organisational development techniques for analysing problems. Change comes with major risk that need to be managed for better results. Whether from the financial institutions or from the organisations, manage risk enables reduce long term return on investment (Beziade & Assayag, 2014). It is very important for modern organisations to risk control at the centre of every decision-making process.

1.3.2 Business Process Transformation

Deploying new tendency on the existing business work the so-called AS-IS processes is very recommendable for companies that want to be up to date. In most organisations, business processes have been traditionally made over time with uncontrolled change. Setting right people at the right place in a company allows to optimise efficiency of business process. In doing so, redesign of business process meets both skills and business upgrade. Furthermore, people participating in a specific process as well as process owners should know the high-level process of the department and the sub-process of their functional unit.

Business analyst who easily match company's vision and business requirements before end-users should first handle reengineering business processes. Reengineering of business process using IT platform allows not only to automate the process but most importantly to easily access data. This brings up needs of system computerisation following system infrastructure and architecture requirements. Timelines and constraints need to be considered while dealing with the implementation of business process reengineering. Management should be reshaping their business approaches to meet future management practices enforced by the digital world.

Among all management functions in an organisation, process of the main function of the business such as marketing, human resources manage, operations, finances, and information technology (IT) are designed to optimise utilisation of business resources and thus obtain valuable business outputs (Smith, 2001). However, evidence showed that successful business process transformation relies on the management of organisational change, leadership, and strategy.

1.4. South Africa as a Country

Socioeconomic issues that create instability in the country predominantly affect South Africa. The higher rate of unemployment and poverty always trigger social troubles. The continuous negative balance of the current account tends to decrease the gross domestic product (GDP) per capita (Deloitte, 2015). There is a hope on potential growth since South Africa has started the journey towards being a fully digitalised country. Repetitive political troubles weaken the economic market since investors are afraid to invest. Since 2019, South Africa is experiencing economic recession due to currency increase and price inflation. The situation has become worse with the pandemic of the Corona virus (COVID-19) that forced the country to be on lockdown due to the national disaster. Form phase 5 to phase 4 of the lockdown, only few businesses managed to open.

1.4.1 Financial Institutions in South Africa

Financial institutions include Investments, Insurance, Microfinance institutions and Commercial banks such as FNB, Standard bank, Nedbank and Absa bank. Financial markets in South Africa comprise money, equity, derivatives, bond, commodities, and foreign exchange markets. The South African Reserve Bank (SARB) supervise and regulates management of financial sector.

1.4.2 South African Banking Sector

In South Africa, financial institutions are under the management of South African Reserve Bank (SARB) that supervises bank activities and insures overall financial stability in the country through regulations (SARB, 2018). SARB defines regulatory instruments such as bank act, regulations, directives, circulars, and guidance notes as published on their website. The prudential Authority (PA) ensure good supervision of banks to thus protect the country as a whole. As published by SARB (2018), banking sector in South African comprises 17 registered banks, 3 mutual banks, 2 co-operative banks, 15 local branches of foreign banks, 31 foreign banks with approved local representative offices. Given the oligopolistic banking market

competition in South Africa (Mlambo and Ncube, 2011) only four large commercial banks namely First National Bank, Standard Bank, Nedbank, and ABSA represents more than 86% of the total industry assets as confirmed by SARB (2018). Although the degree of competition is very low, the banking industry growth continues to improve given the level of financial stability and the country's GDP (Growth Domestic Product) growth per capita. According to South African bank legislation, all banks are subject to the principles of financial inclusion that "entails improving the range, quality and availability of financial services and products to the unserved, underserved and financially excluded" (SARB, 2018). Following this principle, all South African banks should provide financial products and services that fulfil business needs as well.

Source: SARB (2020)

Figure 1.4: Banking sector in South Africa

Registered banks comprise categories such as banks in liquidation, branches of foreign banks, foreign bank representatives, foreign controlled banks, locally controlled banks, and Mutual banks. Example of registered bank per bank categories as published by the SARB (2018) are displayed on the table 1.1 below.

Table 1.1: South African registered banks

Bank liquidation	**Branches of foreign banks**	**Foreign bank representatives**	**Foreign controlled banks**	**Locally controlled banks**	**Mutual banks**
Islamic Bank Limited	Bank of Baroda	AfrAsia bank Limited	Absa Ban Limited	African Bank Limited	Finbond Mutual Bank
Regal Treasury Private Bank Limited	Bank of Chin	Banco BIC	Albakarata Bank Limited	Bidvest Bank Limited	GBS Mutual Bank

	Bank of India	Bank of America	Commonwealth Bank SA	Capitec Bank Limited	VBS Mutual Bank
	Deitshe Bank AG	Eobank Ghana Limited	Habib Overseas Bank Limited	Discovery Bank Limited	
	Societe Generale	Swedbank AB(Publ)	HBZ Bank Limited	FirstRand Bank Limited	
		National bank of egypt		NedBank Limited	
		The Mauritius commercial bank Limited		The Standard Bank of SA	

Source: SARB (2018)

The current research focuses on the big four banks in South Africa namely Absa, FNB, Nedbank and Standard Bank.

1.4.2.1 Absa Bank

Absa bank is one of the "Big four" banks in South Africa and its forma part of the Absa Group Limited that is registered on the JSE. Absa bank holds around 42 000 of employees and is represented across 12 countries across the continent namely Botswana, Ghana, Kenya, Seychelles, Tanzania and so on. There are Absa representatives' offices in Namibia and Nigeria in addition to insurance operations in Botswana, Kenya, Mozambique, Tanzania, Zambia and South Africa. Aba strives for purposes such as bringing possibility to life, customer obsession, acknowledgement strength of people, develop African heartbeat and aligning values to actions as well as following core values such as people, driving high performance and sustainable Besides achieving purposes while following significant core values, Absa equally develop attractions through gallery and Museum exhibition.

1.4.2.2 FNB Bank

FirstRand Bank Limited (FRB) is the holding company of FNB, Rand Merchant Bank (RMB) and Wesbank. formed through the amalgamation of Rand Merchant Bank Holdings and Anglo Americans financial interests in 1998. First National Bank (FNB) is the oldest South African banking institution created in 1838 and is today the third largest bank in South Africa (SARB, 2019). FNB is a wholly owned subsidiary of FirstRand Bank limited, FNB has operations in South Africa, Botswana, Namibia, Swaziland, Lesotho, Zambia, Mozambique, Tanzania and India. FNB bank is registered as an authorised financial services and credit provider number NCRCP20. This matriculation and practice number allows FNB to offer services such as

personal, private, business, commercial as well as corporate banking across South Africa. Consistently the cheapest bank in South Africa, FNB pricing strategy of increasing below official inflation rates has ensured price competitiveness within the South African consumer banking market. Their business model includes an extensive array of rewards for customers that returns value to their customers in the form of e-bucks (points earned through point of purchase spending that are converted into tradable currency with selected retailers in South Africa), fuel cash back rewards and data rewards through their FNB Connect product range. Their deliberate incentivisation of electronic banking solutions has gained them extensive market presence in the electronic banking market. This is coupled with their philosophy of returning the benefits of any economies of scale achieved through their innovative initiatives to their customers. FNB has is recognised as the bank with the best reputation in South Africa. It is also viewed as the bank with the strongest brand in the mind of the consumer in 2012 by RepTrak Pulse Survey and the Mail and Guardian Top Companies Reputation Index (FNB, 2012). The first national bank (FNB) is a division of the FirstRank Bank (FRB) listed at the Johannesburg stock exchange (JSE) in South Africa and the Namibian stock exchange (NSX). It comprises retail, commercial, corporate and investment banking services provide in South African and in international niche markets. FNB is represented in many countries in Africa such as Namibia, Ghana, Kenya, and Nigeria and beyond such as United Kingdom, India, Dubai and Shangai.

1.4.2.3 Nedbank

Nedbank Ltd is an authorised financial service in South Africa with a registration number 1951/000009/06 and holds a registered credit provider number NCRCP16. Nedbank Group Limited is an expanded financial services provider that offers a wide range of wholesale and retail banking services together with the insurance, asset management and wealth management solutions (Nedbank, 2020). Nedbank operates in six countries in the Southern African Development Community (SADC), through subsidiaries and banks in Lesotho, Malawi, Mozambique, Namibia, Swaziland, and Zimbabwe (Nedbank, 2020). Nedbank also has representative offices in Angola and Kenya (Nedbank, 2020). Nedbank has a presence in key global financial centres in Guernsey, Isle of Man, Jersey and London, and a representative office in Dubai, to offer international financial services for clients in South Africa and Africa (Nedbank, 2020).

1.4.2.4 Standard Bank

Standard bank is one of the institutions under the standard bank group that offer a range of financial services such as personal and business banking as well as corporate and wealth services in South Africa and across sub-Saharan Africa (Standard bank, 2020). The overall group focuses on increasing Africa growth through values creation for all stakeholders while developing digitally enabled financial services. The Industrial and Commercial Bank of China is a strategic partner of the group owning 20% of shares. Standard bank of South Africa is the largest bank in the group that operates in the South African sphere through change alignment, people development in addition to improving digital competitive advantage (Standard bank, 2020). They are listed at the Johannesburg Stock Exchange (JSE) as well as at the Namibian Stock Exchange. Banks belonging to a group publish both the annual integrated report for the group and its own annual report also called the reporting to society report.

1.4.2.4 The Role of Banks

The SARB is the guardian of the financial institution management in South Africa. The SARB has four subsidiaries namely the South African Mint, the South African bank note company, the corporate for public deposits and the macroprudential approach and the prudential authority. Each subsidiary plays a critical role in the process of keeping a stable and well-structured financial market in addition to the bank supervision. Banks play a critical role in the economic development of a country considering the following roles financial intermediaries, channelling saving into real investment, management of personal finances, investment and wealth and clearance and settlement of payments as well as the supply of financial Information like stakeholders 'creditworthiness and securities prices. Known as financial intermediaries, banks are both lenders and borrowers in between government, businesses, households, and foreign transactions. On a daily basis, banks ensure financial stability while maintaining headline inflation within the acceptable range.

1.5. Performance of Banks

Determinants of business performance of whether commercial banks or organisations can be grouped as financial and strategical determinants. On a financial point of view, profitability constitutes the measurement criteria of business performance. Besides global financial indicators, companies and previous researchers focus on financial ratios as critical determinants of business performance. However, it is important to note that these ratios have different meaning under specific markets conditions. Strategical determinants can be both internal and external to the business with important impact on the productivity. The recent financial crisis

affected performance of many financial institutions around the world. In order to avoid eventual financial depression, financial institutions invest on key performance indicators using both financial and strategical determinants to be aware of the upcoming financial conditions. Increase on technological innovation on social media's platforms force organisations to review and upgrade their business systems to meet customer expectations.

In South Africa, social medias such as Facebook, Twitter, and LinkedIn are gaining space in the business sphere. This suggests that users are digitally wise and know how to extend their expectations. Performance is about good management that includes processes, functions, and personal perspectives as highlighted by Smith (2001). Although management needs to be defined in a specific business context, it is important to consider the type of organisation, the culture as well the environment whether national or international. The great economic significance role of bank goes in hand with the creation of money that led to an improving productivity considering the accounting equation whereby assets – liabilities values equal capital or equity (Assets - Liabilities = Capital/Equity) in the balance sheet. A simplified version of bank' balance sheet appears as follow:

Table 1.2: Banks' Balance Sheet

Balance Sheet	
Assets	**Liabilities**
Reserves form the Central bank	**Capital/Equity**
Government bonds	Demand deposits
Loans (Business and Consumers)	Interbank deposits
Mortgages	Saving accounts
Land	Borrowing from other banks (Local or global)
Software	
Total Assets	**Total Liabilities**

Source: SARB (2019)

Banks' performance is measured its profitability through financial ratios namely Return on Equity (ROE), return on assets (ROA) and cost-to-income ratios. These ratios are the percentage of profit over the equity amount or the assets value. Other financial rations such as total capital adequacy, efficiency and credit loss ratios also tell us about operational performance of the chosen bank. Evidence shows that good management of risks enables great

return. Banking operations are exposed to crucial risks such as credit, market, equity, interest rate, liquidity, operational and other risks.

1.5.1 Organisational performance

According to Smith (2001), measuring performance depend on five factors namely what is to measure, number of measures, accuracy, reporting and costs. Management, operational and financial ratios are the key indicators success to measure business performance as highlighted by Smith (2001). Performance needs to always match business standards. Sometimes, business to business system integration is defined to optimise business outcomes. Financial institutions such as banks, mutual funds, credit unions, insurance companies are financial intermediaries that enable financial service to deliver financial transactions to the customer. As intermediaries, they play the role of brokers, asset transformers, credit allocation and transmission of monetary policy (Saunders & Cornett, 2011). The current study focuses on banks especially South African commercial banks. Banking performance can be rated based on return-risk performance because financial institutions take risks on financial services offered and expect return on investment. So, the return-risk performance drives the financial institutions process following financial regulations. Financial institutions performance has changed their way of offering financial services due to the effect of technology. Somehow, increase on internet and technological change drastically affect banking process in South Africa through internet banking and use of bank applications. According to Saunders and Cornett (2001), performance indicators of commercial banks and saving institutions are measured by the financial ratios such as Return on assets, Return on Equity, Provisions for loan losses to total assets, Net charge-offs to loans, Asset growth rate, Net operating income growth and the number of failed/Assisted institutions.

1.5.2 Financial Risk Management

Organisational performance relies on the risk management capacity. Good risk management improve productivity and profit compared to a higher risk appetite that expose the business. From country or sovereign risk to foreign risk through technological risk, financial institutions experienced multiple types of risk while delivering financial services. Saunders and Cornett (2001) defined several models to measure financial risks as depicted on the table 1.3 below:

Table 1.3: Risk Measurement methods

Risks	Risk Measurement models
Interest rate risk (Refinancing risk, reinvestment risk)	Funding gap model; Duration model
Market risk (Firm-specific credit risk, systematic risk)	Market risk model: Risk metrics, historic or back simulation and Monte Carlo simulation model
Credit risk	Credit scoring model, RAROC (Risk-adjusted return on capital)
Foreign exchange risk	Purchasing power priority
Country or sovereign risk	Statistical models, import ratio
Technology risk	Economy of scope
Liquidity	Liquidity index, financing requirement
Insolvency risk	Market and book value, capital ratio

Source: Saunders and Cornett (2001)

1.6. South African Financial Regulations

1.6.1 Bank and Regulations

South African banks follow multiple rules, policies and regulations that drive the management of the financial system. The bank Act no 94 of 1990 previously known as the deposit taking institutions Act, aimed as follows: "To provide for the regulation and supervision of the business of public companies taking deposits from the public; and to provide for matters connected therewith". The National Credit Act (NCA) created in 2005 allowed to regulate consumer credit and information through improved standards. Since 1989, the South African Reserve Act controls the SARB and the monetary system. Several acts were instituted to regulate the required institutions namely Co-operative banks Act, 2007, Mutual bank, 1993 and financial advisory and intermediary services Act, 2002.In order to maintain risk protection, the Financial Intelligence Centre Act (FICA) was created in 2001 to put in place measures to limit money laundering, terrorist financing and associated activities. The of Basel II standard implementation led to the creation of Basel III standards that aimed to improve risk management, institutional governance, the ability of the banking sector to manage shock emanating from financial and economic stress and to enhance bank disclosure (Mlambo & Ncube, 2011). The Basel III capital requirements stipulates the followings:

- Increased quality, quantity, and consistency of the capital

- Increased risk coverage and the capital conservation buffer
- Pillar 2a and domestic systemically important bank buffer
- Countercyclical buffer
- Leverage ratio to have a minimum of 4%

Digital disruption should be effectively managed by banking regulation agencies as argued by Kroll, Horvat and Jäger (2018) to make sure that open boundaries remain a source of opportunities and not a venue for challenges and failures. Study conducted by Deloitte (2018) argued that digital risks linked to rapid operational, technological, and regulatory change must be manage as priority for policy makers and regulators.

1.6.2 Company Regulations

In South Africa, company as well as financial institutions comply to the company regulations, legislation, laws, and Acts. Every fiscal year, companies published their annual report and/or their integrated annual report in accordance with the regulations as follow:

- The King IV report on corporate governance for South Africa 2016
- The global reporting initiative's standards (For reporting non-financial institution)
- The company Act, No 71 of 2008, after amendments
- The Johannesburg Stock Exchange (JSE) listings requirements
- International financial reporting standards (IFRS)
- The international integrated report (IR) framework

The above reports provide detailed information about activities run by the company or the bank in the following formats namely Summarised results and AGM notices, Annual financial statements, integrated annual report, and the Sustainability living report.

1.7. Background

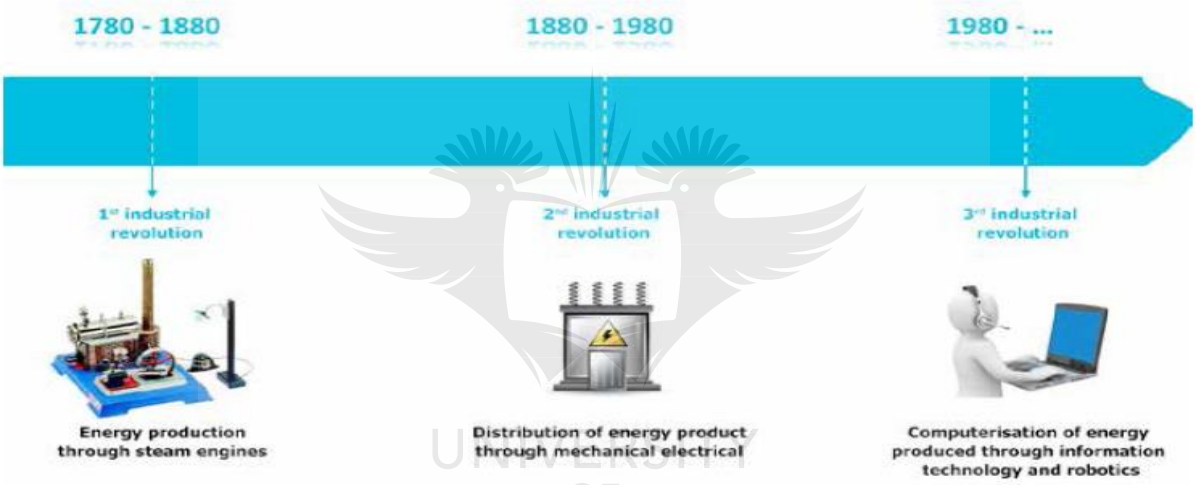
The nature is governed by constant changes and evolution leading to a continuous dynamic environment for people and businesses. At this stage, the fourth revolution also known as digital transformation is the normal consequence and the next step after the revolution of scientific and technical progress that happened in the 40s (Beziade & Assayag, 2014). Consequently, the current generations have to dealing with another type of change.

The history from 1780s revealed that evolution of industrial progress occurred in the world namely first, second and third industrial revolution as displayed on the figure 5 below. Energy production through steam engines in 1780 left place to the distribution of energy product through mechanical

electrical in 1880 that became obsolete and is replaced by computerisation of energy produced through information technology and robotics in 1980. Over time, customer awareness, social medias influence, competition awareness, technological change, market change and cyberattacks have changed the traditional ways of doing things.

After the financial crisis that occurred in 2007, some experts saw the importance of banking digitalisation following a specific approach called the cure for the shattered banking industry. Banking strategy was built on product-centric or customer-centric view dependence on the market sphere and the customer knowledge.

Today's approach is completely different in the sense that organisations are following both product and customer –centric approach to optimise performance achievement.



Source: Beziade and Assayag (2014)

Figure 1.5 : Industrial revolution overtime

Customer behaviour has been always evolving just like the environment in which they live leading businesses to create new cutting-edge products same as the sophisticated and digitalised products to ensure customer satisfaction. Successful evolution depends on the connection between all stakeholders in the economic sphere at national and global levels. Interestingly, this vice-versa relationship of the first digital step to settle by organisations that grow and adapt to the change. Actual observations showed that customers are willing to stop banking whatever the number of year service with the bank to move to another bank where their needs are fulfilled. Customer loyalty is no more a guarantee for companies of today. Rather, customers want to be reward for banking with a specific bank and expect wealth – building advice from banks based on the profile. Communication with customers was done in

a one or mostly two channels such as mailing, call and physical contact in a traditional banking approach. Customer knowledge was limited in a specific field and recognition was based on the number of year service cumulated with the organisations. Overtime, with event of internet of things and smart technologies and devices, customers have gained knowledge and experience from personal research as well as from competitors. Companies are not forced to develop multichannel of service delivery to meet customer satisfaction and to remain competitive in the marketplace.

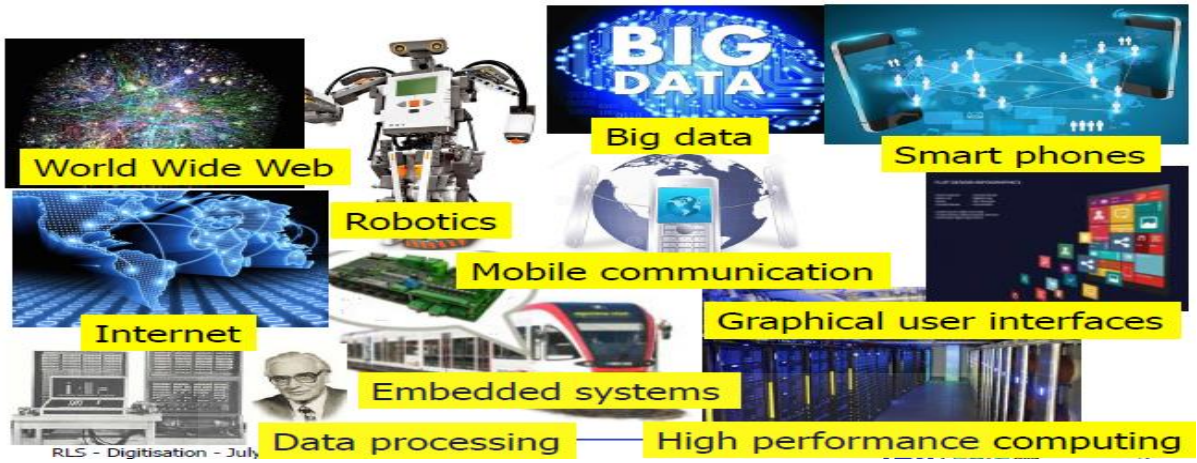
Primary key for banks was about providing financial services only and not minding about customer' feelings and opinions. Banks have developed a long-standing culture of branch-centric banking causing resistance to any change initiative over time. Branch centric banking means that customers need to come to the branch to expose their problems and concerns plus the challenge of long queue at the door. Lack of proactivity from the banks towards customers later lead to complaints and lost in efficiency and effectivity. In addition to this, waste of time and clash during personal interaction at the branch lead to account closing and financial lost by the banks. In a monopolistic or oligopolistic market conditions main leaders tend to not be proactive and do not work on differentiation because they count on customer loyalty. Increase of technological innovation enhanced process such as individual portal to the bank, loan per assets and liabilities only and manual user credentials to access bank system (Happiestminds, 2014). These welcomed solutions quickly became obsolete with the degree of technological change. Now people are looking forward to having a single portal per client, biometric / retina scan login and one click processing for borrowing and investment as predicted by Happiestminds (2014).

Although banks are known as being slow movers, customer knowledge and experience has increased the expectations level of banking services and thus forced banks to pick up the pace towards digital transformation. In fact, technological advancement of social media's platform offered several features that increased the customer experience and knowledge of smart technologies. Financial institutions have been in their comfort zone for decades with no pressure to change and without any threats from inside or outside of the industry. Nowadays, banks are threatened by competition from adjacent industries such as Fintech, further control from regulators and technological innovation absolutely change traditional banking business model Atkearney (2018). Banks now need to work hard in terms of good product and efficient service to conserve customer loyalty compared to the traditional model where there was no pressure to satisfy the customer. Banks are not now realising that they cannot keep the same

shape as before due to continuous change whether from the environmental pressure or the customer expectations. Digital natives do not need to keep specific relationship with the bank as old generation because internet allow remote connectivity. They are more excited about new products from any source that reflect technological upgrade and always seek for the best. Although banks need to be closed to the customers, it needs to be done through digital channels using digital management tool and virtual assistance (Deloitte, 2018). In the old business generation, new markets entrants caused disruption only. Today both digital transformation and new entrants leading to new kind of competition such as Fintech cause disruption… Fintech companies challenge traditional banks by offering products such as Digicash, PayPal and Kickstarter that are very efficient with online banking services (Deloitte, 2018). Sudden change occurring in the financial services sector are not all matured giving enough time to readjust their operations and adapt.

Compared to traditional age, digital transformation comes with an increase of cyber-attacks as another form of disruption. The 2015 Eurobarometer revealed that 42 percent of Europeans feel unsecure with online payments. Regulatory framework and security of internet payments is a major concern for financial institutions. In Luxembourg for instance, the CSSF circular 15/603 implemented the EBA guidelines into the regulatory framework to manage internet security (Deloitte, 2018). From personal devices to industrial systems, digitalisation affects every area of personal, public, or business life. However, the level of impact differs from country to countries due to the level of economic development. In African context for example, shifting from traditional thinking to digital approach remain a huge challenge. In the African digitalisation report published by Siemens (2017), it is stated that meeting digital change depends on governments, business, labour, and academia to implement change at the first stage while creating an environment for knowledge sharing and execution to facilitate mindsets change. They also pointed out that supply of electricity; manufacturing and transportation are the digital industry indicators that determine a successful digital execution. As a disruptor, digitalisation has changed the market competition approach through technological change in a sense that traditional business easily loses their market position due to new entrants with advanced technology infrastructure. Large established companies that used to be leader in a specific industry find themselves as followers and now compete against companies without experience in the area. This suggests that market environment is not only about well-established companies but about also mostly about companies that can easily adapt to change and develop innovation strategies through smart technologies. Digital change comes with the

following requirements to be met forcing companies to reshape their core businesses. Digital change includes big data management, smart phones, internet, embedded systems, data processing, and graphical user interface among others as displayed on figure 1.6 below.



Source: Oracle (2018)

Figure 1.6: Digital change naming in convention

Getting digitalised is a project on his own in the current century where things move fast, change and easily get obsolete. Important skills and approaches need to be put together to manage the giant threat. Technological platforms such as social medias, internet of things, mobile computing, cloud computing and cyber security are the key drivers and enablers of digital disruption (Schreckling & Steiger 2015). According to Markovich et al, (2014), digital transformation mostly enables business processes to be fundamentally reconfigured to optimise business outcomes. Accoding to Sabbagh et al. (2013), digitisation is a mass adoption of digital services and connected devices by governments, organisations, and consumers. They pointed out that digital revolution accelerates economic growth through increase of gross domestic product (GDP) per capita and promotes job creation based on the econometric analysis published by Booz & Company (2013).

Region	GDP impact (US$ billions)	Number of jobs created
Africa	8.3	618,699
Commonwealth of Independent States	11.8	340,820
East Asia and the Pacific	55.8	2,370,241
Eastern Europe	7.0	159,015
Latin America and the Caribbean	27.0	636,737
Middle East and North Africa	16.5	377,772
North America	25.3	167,650
South Asia	9.4	1,117,753
Western Europe	31.5	213,578
Total	192.6	6,002,266

Source: Booz & Company analysis (2013)

Figure 1.7: Digitisation's impact on GDP and jobs, 2011

Booz & company(2013) declared that digitisation improved the worldwide economic outputs to US$193 billion and thus created 6 million jobs in 2011. Digital disruption brings change to existing economic structures namely emerging and developed economies. Regarding the number of digital implementation failure, it shows that no plans are put in place to face the future wave of technological change. It is up to the governments and policymakers to define relevant measures in order to protect existing economies from downgrading and thus define strong foundation for the new economic structures. Policymakers should define proper digitisation plans, boost development of new capabilities and work in concert with all economic sectors to achieve implementation of digital requirements (Sabbagh et al., 2013). The stage of digital development is constrained, emerging, transitional, and advanced as defined by Sabbagh et al. (2012). According to Siemens (2017), the levels of digitalisation can be classified into for maturity levels namely emerging, developing, established and advanced levels.

- **Emerging:** In this stage, organisations or countries encounter challenges while pursuing digital transformation
- **Developing:** Companies already make a first step in the digitalisation process but is still facing some challenges
- **Established:** Organisations have gain maturity on the digital adoption but with need of advanced solutions in some areas
- **Advanced:** In this level, organisations, and countries as a whole already gained full maturity and adoption in the digital transformation

According to Siemens (2017) digitalisation is the use of digital technologies to transform business models and create new revenue channel and value-producing opportunities. They argued that disruptive technologies describe a process where smaller companies easily challenge well-established business due to how digital they are. Although digitalisation increased efficiency and optimisation of business processes and workflows. Whether categorised as optimiser, preserver or visionary, companies use digitalisation projects to design their future core business and thus avoid the status quo. Internet of things is "the network of physical objects, devices, vehicles, buildings and other items which are imbedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data". According to Brainstormingmag (2019) digitalisation can be defined as a way of leveraging digital technology and insights of information, communication, and technology (ICT) to meet customer benefits.

Whether digitalisation or digitisation, the concept means transformation of information and communication in digital or numeric form to be available anywhere and anytime through any digital channels (Omig, 2016). Digital technologies are transforming the banking industry as a whole and in meanwhile disrupting traditional way of doing business. With the emergence of Internet of Things (IoT), questions arise on how these enabling technologies affect the banking sector and the overall financial economy. Business agenda reveals a lot of business approaches and models to face the digital change and to remain sustainable. Digital technologies boost innovation, creativity and multi-models' solutions to optimise the productivity and service delivery (Smith, 2001). At the business level, acceptance, security and privacy are the key elements to fully meet customer' satisfaction. Companies are forced to be digitalised for revenue growth, cost cutting and problem-solving purposes.

1.7.1 Strategic Management

Management is about "Using resources in an efficient and effective way so that the end product is worth more than the initial resources" (Smith, 2001). This definition emphasis on the role of management to make it happen. But mangers are not the transformers. They make the job done by other people. Parker (1941) defined management as "Getting things done by other people". This suggests that other people play most important role in the management process compared to management themselves. According to Smith (2001), management is the "activity of getting other people to transform resources so that the results add value to the organisation in terms of reaching its organisational goals". Chief Officers also known as C-suite managers are responsible for the performance of the company as a whole because they first deal with the

strategy through definition of new business vision and its achievement. They are primarily concerned by the sustainability and long-term survival of the organisation. According to Smith (2001), step-by-step of management process includes planning, organising, staffing, deciding, controlling, reporting, and budgeting. This is also applicable for an organisation that needs to get prepared to handle the giant advent of digitisation. In doing so, organisational entities should analyse all angles beforehand and thus forecast financial implications to not be surprised by the upcoming change. Surviving in the new dynamic world is about developing competitive advantages through improvement of core competences or critical success factors. Companies should now move from competitive advantage to competitive intelligence by using smart tool associated with smart technology. Being ahead of the technological innovation help companies to acquire technological superiority in the industry and therefore increase market positioning. In addition to the SWOT analysis as a strategic method, PESTLE analysis gives factors at a higher level that impacts business growth namely political, economic, sociocultural, technological legal and environmental factors. Regarding the amount of change coming with the globalisation, organisation have a choice between adaptation and continuous innovation to survive.

According to Smith (2001), organisations should define specific strategies based on dimension types such as the size, change adaptation and innovation as well as business and customer focus. Companies use their core and geography competences to innovate in terms of product differentiation, imitation, cost leadership and fast development. Globalisation, IT industry dominance, country growth and at a certain instance retrenchment are the changes that influence businesses. Additionally, corporates move from stage such as prospectors, defenders, analysers and reactors during the innovation growth. Whatever the strategic plans chosen by the company, management by objectives is more relevant as it put all other plans together to from a single and powerful strategic plan. As part of the ethical principles, organisations should comply with the environment sustainability, fair trade, and fair employment. Companies and organisations contribute to the environment progress through social participation in the community, transparent governance, and supply of accurate information as well as of adding value to people and generation to come.

1.7.2 People management

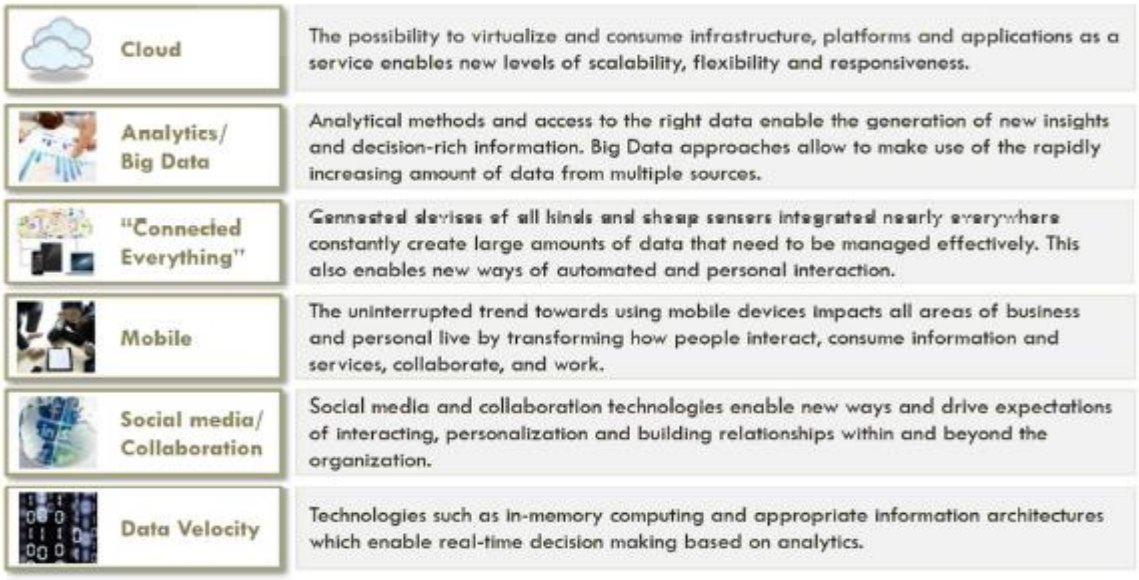
From a departure point of view, evidence showed that people are at the centre of change management process. In doing so, let us shed a light on people 'role regarding change management. From mental ability to personality and IQ, observations reveal that employee

development through training, upskills and upgrading is the responsibility of the organisation as part of the skills development levy (SDL). In order to restore balance between what an employee can offer into a job and what he can get out of it, companies put in place periodic employee growth scale. Such approach improves motivation and learning skills that at his turn increase productivity that at the end of day benefit the business. Employee participation to decision-making process through whether suggestions, idea quotas, brainstorming or the Delphi technique improve commitment to work (Smith, 2001). Procrastination and decision failure are the sources of lost in commitment at the workplace. Company leadership should always ensure respect of governance and ethical policies for the business image and brand.

1.7.3 Digitalisation

Global change in frequency as well as in amplitude shows the dynamic impact on businesses around the world. Getting digitalised is no longer a choice but a constraint for any living organisation. PWC (2017) sees cloud and internet of things as suppliers of digitalisation. It affects the overall company by means of the business strategy. Digital strategy is a form of strategic management applicable in the era of digital transformation. As foundation of the future, digitalisation is led by business-to-business or business to customer's automation. Although investing on new digital technology remains a huge challenge, organisations do not have any choice because products, practice as well as processes need to be continuously upgraded. Upgrading process allows business to follow new technology while meeting customer satisfaction. It is important for business to choose the relevant technology to invest in and to reach return on investment in not long-term. Digital strategy requires a different approach to manage business to business in on hand and business to customer on the other hand. Digitalisation is seen as the application of information and technology to increase business as well as human performance (Chelbrugh & Gaman, 2009). Many authors such as Hbr.org (2018), Hansen, Nohria and Tierney (1999) and Strategyand (2018) argued that talking about digitalisation should always refer to digital strategy at first place. This suggests that traditional business strategy should be reshaped to digital strategy to be aligned to technology transformation. According to Havard Business Review (2017), there are six types of digital strategy namely platform play, new marginal supply, digitally enabled products, and services, rebounding and customising, digital distribution channels and cost efficiency. Digital strategy covers innovation and product development, supply chain and operations and most importantly marketing, sales and services all enabled by the workplace and infrastructure as argued by PWC (2017).

A knowledge of business history through analysis of trends is the way to go to predict new tendencies. Observations showed that getting digitalised is also about merging or integrating third parties and business operations or become a service provider situated between suppliers and end customers. Digitalisation affects each and every aspect of the business leading to an overall transformation. True digital transformation reflects on digital practices fully incorporated into business through customers, growth, efficiency, and innovation as highlighted by Accenture (2017). Above all, smooth implementation of new digital technology depends on the governments and policymakers through definition of appropriate rules and regulations that improve economic growth. Besides focus to be made on digital strategy, Bain (2017) focused also on business model and enablers as key elements to consider while starting digitalisation journey. In south Africa, ICT providers companies such as MTN, Vodacom and cell c put in place different approach in the new world to counter security risk and ensure appropriate end-to-end security solutions to the users. Advance technologies are always risky technology in a sense that technological devices as well as data are exposed to external attacks. At first sight, moving to the cloud has been the solution to protect data in a mobile world. According to Sabbagh et al. (2013), the process of digital transformation is done at economic, society and governance level affecting GDP growth, job creation, life quality and access to basic services. Observations showed that it should also start with the change of mindset and development of online vigilance approach from people perspective. Besides all, it is important to note that increase on electronic commercial transactions also increase electronic fraud such as phishing, spyware and frauds. Figure 8 explains key drivers known as the enablers of digital technology trend.



Source: Accenture (2014)

Figure 1.8: Key enabling of digital technology trends.

Smart technologies and data processing equally pose new issues related to data protection against internal and external attacks such as “Bring your own device” and the cyber-attacks. In summary, South African banks can and will ultimately deploy efficient digital strategies in all areas if financial services offered are the in supervision of the South African reserve bank (SARB). Given the pivotal role playing by banks in improving the economy, banks must quickly adopt and master new technology to achieve better performance before the customer does. In one way or another, sectorial management of banking industry maintains confidence and privacy protection of customer data.

1.8 Research Problem

Digital revolution has caused disruption to the traditional banking transactions in South Africa forcing banks to quickly adopt digital transformation. Since the new digital environment is considerably dynamic, pace of change must be faster than ever (Oracle, 2018). But companies, organisations and institutions in South Africa are not yet aware of the importance of being ready because they prefer keeping the status of “digital shy” as developed by PWC (2018). Whether from strategical, customer knowledge, banking process and change preparation point of view, observations showed that the roadmap to digital change is still full of ambushes for South African banks as highlighted by PWC (2018) and Accenture (2018).

SA banks are not well prepared to move from the traditional to the digital stage where their banking processes are fully automated. Although implementation cost can be exorbitant, digital change has become mandatory for banking improvements. The 2013 survey conducted by PWC (2018) on South African banks showed that: “Bank executives acknowledge the threat posed by non-traditional competitors, such as retailers and mobile service providers”. Hence, the need of implementing digital strategies. Although strategies can be put in place, the truth is that face-to-face interaction at the bank branch takes over initiative of using digitalisation channels. This does not help the customer to become experienced and get used to digital channels that are paperless, less time consuming and efficient. Digital change should start at the customer level and ultimately spread to the rest of the financial institutions. But unfortunately, banking websites are not that user or customer friendly because people always need to go to the bank to have their problem solved. Bank’ customers always need to email several documents whereas banks should have a shared customer details database both

internally in a bank or between banks or externally with other national or international organisations to have clear information and thus free people from continuous identity update and validations.

Banks have been using old design processes that are only branch related forcing customers to go to the branch to get their issues solved. This suggests that bank processes are not up to date regarding new digital objectives to be achieved. People need to be equipped enough to handle change around digitalisation. Banks failed to upgrade human resource skills and to define appropriate change management for the long-established people and structures. People as well as stakeholders namely Investors, government and other participants besides new markets entrants need to be analysed by banks to manage associated risks. PWC (2018) on his article about how they see bank of the future in South Africa, highlighted that banks go for peripheral change instead of applying innovation to the core business capabilities and the culture. Knowing that change is evolutionary and not revolutionary (Yoo, 2010) it is up to the banks to follow new digital trends. Digital evolution comes with major challenges that affects the product, the service and the financial environment as highlighted by Deloitte (2018), the major problem that South African bank will face is related to connectivity and accessibility. Banking sector has the duty of being always up to date regarding smart technologies in and advanced analytics order to counter attacks and deliver appropriate service to the individuals and the business. Nevertheless, it happens that real opportunities of smart technologies are not fully explored in the banking industry in South Africa. Besides cost implications, electricity shortage and constraints are regarded in South Africa as a challenge and an obstacle for digital transformation.

Banks are now vulnerable in the financial sector with the emergence of financial technologies institutions that also offer financial services at lower cost and easily shift to any customer needs (Deloitte, 2018). Survey conducted by PWC (2018) actually showed that from 2007 to 2013, South African banks by mean of the big four have not been sustainable on the product or service that they offer. For instance, Absa and Standard banks were on the top with internet banking offered in 2007. However, in 2013, it is FNB that was ranked as the bank that offer good and reliable internet banking services. Banks have all customer information and their financial details and thus know what they deserve but they do not capitalise on that to upgrade individual webpage and to improve customer service delivery. Regulations and financial procedures should allow banks to use customer information to the best of service quality without violating customer's privacy and confidence. Cyber threats continue to slow down financial institutions'

commitment to move to a complete digital banking because IT infrastructure and banking operations do not always meet compliance guidelines in terms of system security architecture. Evidence showed that individuals and organisations mostly see digitalisation as related to IT infrastructure innovation whereas the focus should be on product, price, people and processes as highlighted by Oracle (2018) in order to improve banking performance.

In South Africa, public sector has a predefined framework at the administrative, provincial, municipalities levels to guide execution when an event occurs. As far as this study is aware, the SARB has failed to provide an updated and digital banking performance framework that guides banking' behaviour and constitutes the roadmap towards fully digitalised SA banks.

1.9 Research Purpose and Aim

This study will be guided by the following main goal and objectives as follow.

1.9.1 Primary aim of the study

The major objective is to evaluate digitalisation and business process reengineering in improving banking performance following a perspective of South African banks.

1.9.2 Secondary aim of the study

The secondary objectives are as follow:

- To evaluate whether digitalisation has a statistically significant effect on the efficiency of bank performance in South Africa.
- To evaluate whether business process reengineering has a statistically significant effect digital banking performance in South Africa.
- To evaluate whether a banking performance conceptual framework has a statistically significant effect on the digital banking performance in South Africa.

1.10 Research Questions

The following research questions will guide our investigation:

- To what extend can the digitalisation enhance digital bank performance in South Africa?
- To what extend can business process reengineering enhance digital bank performance in South Africa?
- To what extend can the banking performance conceptual framework optimise digital bank performance in South Africa?

1.11 Research Hypothesis

Below are 3(three) relevant research hypotheses according to our problem statement to determine relationship between variables and be testable (Salkind, 2012:94)

Hypothesis 1: South African banks that follow the digitalisation upgrade can enhance or not their business performance.

Hypothesis 2: South African banks that apply business process reengineering can enhance or not their business performance.

Hypothesis 3: South African banks that follow the banking performance framework can optimise their performance.

The average of variables from 2010 to 2018 will allow to criteria as if P-value < B, reject the null hypothesis; if P-value > B, accept the null hypothesis. B defined as being level of significance.

1.12 Contribution to the study

The current study presents insights on how South African banks should achieve a successful implementation of digital transformation and the reengineering of existing banking processes to enhance their banking performance. By exploring the areas of digital business strategies, digital technological innovation, digital customer experience, digital business process reengineering and the use of conceptual framework, the study shows importance of following specific methodology to achieve suitable digital banking transformation (Deloitte, 2015).

Besides standard factors as listed above, the current study involves additional factors such as project management, systems of systems reengineering, bank system integrations, knowledge-based management, cyber security, and digital disaster management that also impact enhancement of the digital banking performance. Both primary data from interviews and research questionnaires and secondary data from the South African banks' websites and the South African Reserve banks (SARB) website will be put together to sustain research findings.

The current study has an ultimate objective of designed a conjunctive Digital Banking Performance Framework with detailed constituents that help to optimise financial service delivery at every stage of the digital transformation. Such financial service delivery model will serve as basis trajectory guidelines towards digital banking transformation in South Africa. As part of the South African bank performance analysis, the present study also focuses on doing a comparison analysis between South African banks in order to define per category banks that

are really committed to digital change as well as the automation of their full baking processes. Challenges and opportunities related to banking digitalisation will be highlighted as well without forgetting the impact of the COVID-19 global pandemic on South African banking performance.

1.13 Conclusion

In addition to the globalisation, the fourth industrial revolution has disrupted and transformed the classical way of doing things. The above introduction and the background have highlighted the need of growing digital. Evidence from developed countries has proven that adoption of the digital transformation is the key for business performance. Previous empirical research argued that South African banks have embarking in the trajectory of becoming fully digitalised since they already have automated banking processes. Now the question is: What happened or is happening in the background for this objective to be achieved?

The study will go through the review of literature to build the theoretical framework based on a theoretical theory with a light shed on the empirical framework. The conceptual framework will be elaborated to build conceptual variables. Research findings will therefore reshape the digital banking performance framework.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter is about the literature review that include investigation around the theoretical and the empirical framework. The theoretical framework emphasises on the main and the secondary theories that evolve around the research field. Factors highlighted in the theories will be analysed to evaluate their influence on the enhancement of digital banking performances. Challenges related to the digitalisation is highlighted as well in the course of this chapter.

This review of literature also focuses on the previous research about the digital variables that impact banking performances in South Africa and beyond. Since the current environment is increasingly dynamic, the current study highlights the importance of having a predefined banking performance framework through analysis and critics of the previous research. The theoretical and the empirical framework are explored based on the dimensions displayed on table 2.1 below.

Table 2.1: Digital performance variable

Dimension types	**Dimensions**
Digitalisation	Business strategies
	Technological innovation
	Customer experience
Business Process Reengineering (BPR)	Business Process Reengineering (BPR)
Banking Performance Framework (BPF)	Banking Performance Framework (BPF)

Source: Own Compilation

2.2 Theoretical framework

The theoretical framework is the part of the study that explains and criticises other research theories around the report topic. The current theoretical framework is based on a central theory that has secondary theories all compiled together to build the framework.

2.2.1 Structure of the theoretical framework

2.2.1.1 Main research theory

The research study developed by Broy (2018) on the digital transformation stated that "The change of the analogue to digital, leading to virtual forms of information processing by application of digital technology, roll-out of digital infrastructure, development and usage of digital applications and digital business models are the induced changes in economy, education and private life". This theory involves substantial factors that govern the overall digital change namely digital change, information processing, digital technology, digital infrastructure, digital applications, and business models. Although factors cannot be exhaustive, this theory established the critical ones.

2.2.1.2 Secondary research theories

Underlined theory established that digitalisation is "About taking control of your customer-experience ecosystem by managing your entire business from your customers' perspective and rethinking your legacy business model" GTB (2018). Furthermore, IT revolution is a challenging business driver and thus constitutes a tool for the competitive edge both internally and internationally (Porter & Millar, 1985). Above-mentioned theories highlight digitalisation (digital technology, digital infrastructure, digital applications), business process reengineering (BPR) and business models as foundation of the theoretical framework that will be elaborated in the up-coming sections.

2.2.2 Digitalisation

Based on the above-mentioned theory, the digitalisation phenomenon includes upgrading of business strategies, technological innovation, and customer experience.

2.2.2.1 Business strategies

Facing digitalisation is about rethinking and redefining an appropriate strategy that will allow meeting new company goals and promoting long-term survival. Business strategies is all about defining tactics and solutions to reinvent the way of managing businesses in order to positively handle change. It includes new governance of people, stakeholders as well as business process. As a form of banking strategies, bank supervision through policies and regulations ensure that invasion of smart technologies allow to manage sector boundaries and risks (Ritika & Tanima, 2015). Although appropriate digital migration is critical for survival, managing strategic, operational, and financial risks is on the other hand a condition for success. Sia, Soh and Weill (2016) used a large Asian bank called DBS to describe the need for banks to adopt a digital

business strategy. They found out that cultivating leadership, developing agile and scalable operations, designing new customer experience and accelerating emerging innovations are the strategies to put in place for effective digital migration. Becoming digital is not about jumping blindly into the sphere of change. Leaders and top management need to define smart strategies as proposed by Ritika and Tanima (2015) to smoothly join the new era of high competition and business racing. Ritika and Tanima (2015) emphasised on the role of information technology to achieve whatever strategies applicable to consumers, businesses and government using multi-channel operators. According to Heinonnen (2007), future banking scenarios should contain passive and proactive strategies because of the degree of change occurring. Although banks can develop digitalised product and services to fit in, it is not advisable for banks to count on passive strategies that weaken the core business. Evidence showed that financial institutions improve services, skills and working methods besides putting in place corporate culture to succeed in the industry competition as confirmed by Happiestminds (2014). Conversely, financial institutions strongly believed that financial regulations and customer confidence is a protection tool against external competition as highlighted by Dapp (2014). Unfortunately, customer confidence and loyalty have move to customer experience where clients are very demanding. Schmidt, Drews and Schirmer (2017) conducted a study on strategic alignment regarding digitalisation of the banking industry in Germany. They found out that internal business structure, information systems as well as business process are not aligned to the customer's requirements and expectations. Although moving towards digitalised business is a challenge, another challenge is about digital strategies put in place by the companies not matching the exact internal business needs and the customer satisfaction. This is also applicable to the public sector as well where there is an urgent need to shift towards digital era governance as indicated by Ewenstein, Smith and Sologar (2015). They concluded that public sector should integrate new functions into the national sphere while developing needs-orientated structures. In a survey conducted by Talon (2010) regarding customer approach by banks, he found out that banks are now developing close relationship with customers by moving from customer centric operational excellence to customer intimacy. Strategically, banks are moving from service-orientated strategy to personal-orientated strategy. In this regard banks first consult customer before any technological change implementation and require customer feedback. For instance: customers used to take the money at the FNB ATM before taking their bankcard back. Customers requested the opposite to be done and FNB bank made it happen. Such bank-client relationship helps bank to be ahead of customers' needs and expectations. According to Banker, Chen and Liu (2010) development

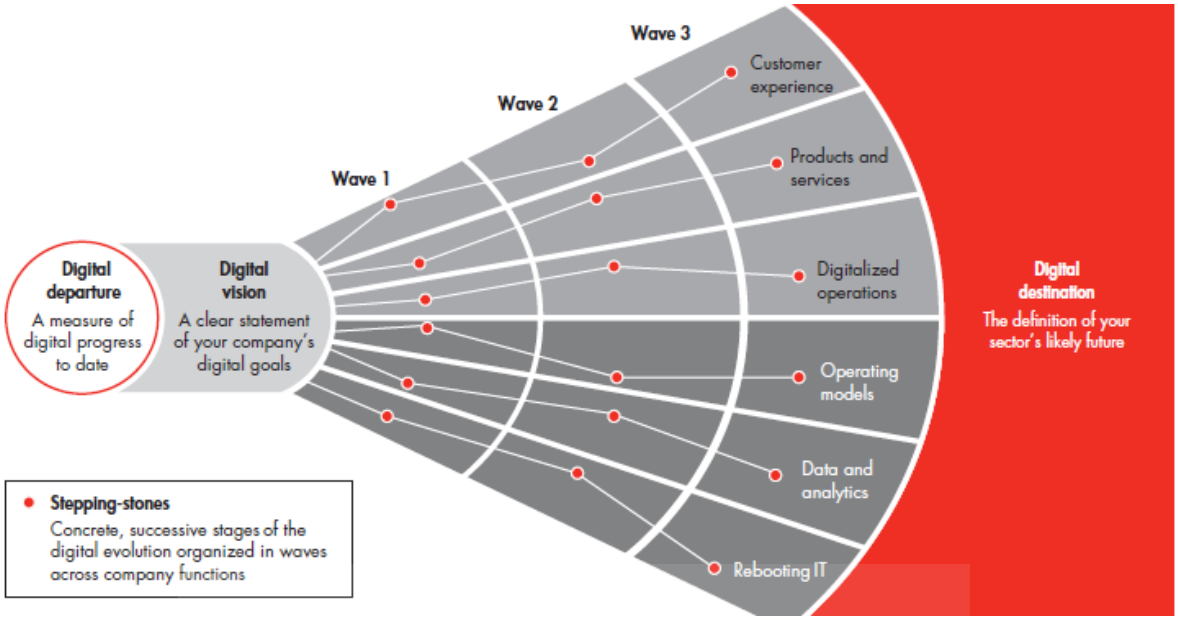
on perfect relationship between customers and banks will lead to future trends such as mobile, configuration, integration point, multifunctional and open points as explained on the table 2.2.

Table 2.2: Customer future trends

Customer future trends	Description
Mobile	Increase on the number of devices for anytime and anywhere connection
Configuration	Customer to configure his own banking products
Integration	Customer to benefit from transparency between systems
Multifunctional	Customer to be able to perform multiple tasks in one point

Source: Banker et al. (2010)

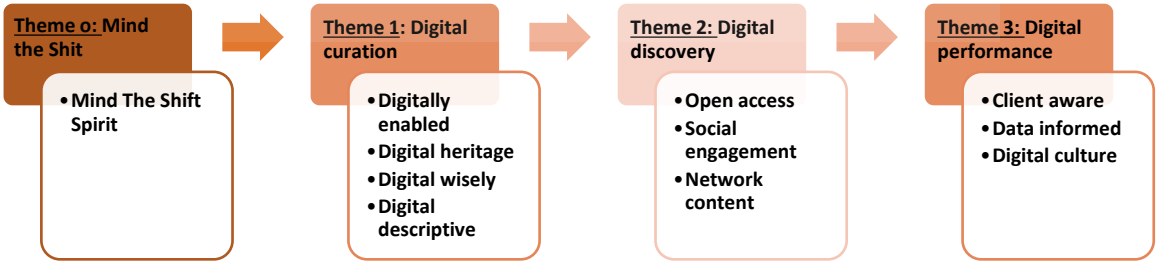
Digitalisation completely transforms marketing processes through omni-channel marketing (Physical and digital) and increases the digital engagement with the customer as well as globalising digital assets following licensed property rights (Wautelet, 2017). Managing such relationship requires leadership skills because it is for the CIO to establish a good interaction between business strategy, marketing, and technology to deliver successful business shifting. In order to resist to the change, Inology (2018) advised that new market entrants must follow seven (7) principles of digital business strategy namely self-knowledge, know the customers, marketplace, resources, market position, engine of growth and tactics. According to Mitsloan management review (2018), achieving advantageous digital strategy is about developing customer engagement strategy or a digitised solutions strategy. They believed that through customer engagement, organisations develop loyalty and trust that further leads to personalised relationships enabling new products innovation and opportunities. Additionally, they argued that digitalised solutions allow integrating multiple products and services to meet customer expectations. A different digital strategy should be developed for business-to-business compared to business to company because they operate in a very complex and different business ecosystem (Bain & Company, 2018). They defined multiple stages of digital evolution namely digital departure, digital vision and digital definition that are associated to specific strategies as displayed on the figure 2.1.



Source: Bain & Company (2018)

Figure 2.1: Stages of digital evolution

At first sight, it is not relevant to assume that digital vision leads to digital destination because vision steps are far away to become business resolutions. This suggests that additional stages such as take-off resolution and implementation should be inserted in the proposed model. Library and archives Canada (2018) believed on another digital strategy approach starting with the "Mind the shift" spirit as responsiveness to change following three themes namely digital curation, digital discovery, and digital performance. Strategic goals are classified per theme as presented on the figure 2.2 below following key concepts of operations, collaboration, and innovation.



Source: Library and archives Canada (2018)

Figure 2.2: Digital strategy goal per theme

Following the research report published by Mitsloan management and Deloitte (2018), it appears that contrary to what other researchers think, strategy is the key driver of digital transformation and not the technology. They argued that the strength of digital technologies is

not about key enablers but how organisations put them altogether to achieve specific goals. Aptitude and capability to integrate those inputs is the results of appropriate strategy put in place by leaders and decision makers.

Table 2.3: Digital strategy stage and variables

	EARLY	DEVELOPING	MATURING
Barriers	*Lack of strategy* More than half cite "lack of strategy" as a top-three barrier	*Managing distractions* Nearly half indicate "too many competing priorities" is a top-three barrier, "lack of strategy" still a challenge for one-third	*Security focus* Nearly 30% cite security as a top-three barrier; managing too many competing priorities remains a top concern for 38%
Strategy	*Customer and productivity driven* Approximately 80% cite focus on customer experience (CX) and efficiency growth	*Growing vision* CX and efficiency growth; over 70% cite focus on transformation, innovation and decision making	*Transformative vision* Over 87% cite focus on transformation, innovation and decision making
Culture	*Siloed* 34% collaborative; 26% innovative compared to competitors	*Integrating* 57% collaborative; 54% innovative compared to competitors	*Integrated and innovative* 81% collaborative; 83% innovative compared to competitors
Talent Development	*Tepid interest* 19% say their company provides resources to obtain digital skills	*Investing* 43% say their company provides resources to obtain digital skills	*Committed* 76% say their company provides resources to obtain digital skills
Leadership	*Lacking skills* 15% say leadership has sufficient digital skills	*Learning* 39% say leadership has sufficient digital skills	*Sophisticated* 76% say leadership has sufficient digital skills

Source: Mitsloan management and Deloitte (2018)

Table 2.3 above also highlights the fact that designed strategies should correspond to specific phases of the digital evolution meaning early, developing and maturing. Global economies go in hand with global competition driving companies to redesign their business processes in order to remain competitive and grow. Consequently, getting globalised and digitalised is no longer an option but a solution for strategic survival. Following the SWOT analysis, Porter (2008) argued that for organisations to ensure long-term growth they need to reshape their business strategies, operations, processes, and procedures with alignment to the global exigencies.

Digital agenda

Digital storm has brought radical changes through improvements of certain financial services and decrease of others (Gartner, 2016). Implications on core business causes restructuration of business models as pointed out by Schumann and Tittmann (2015) with the adoption of Internet of Things. Regarding the pivot role playing by financial institutions in the global economy, being ahead of technological advancement is the key for future long-term survival (Skinkel, 2010). Digital transformation in the financial sector enforces new business models, reduces financial service intermediation, and improves close and dependent relationship with the

customer as highlighted by Cziela (2014). According to him, digitalised financial services should be categorised into business, customer and technology relationship that works altogether to meet digital challenges. In fact, digital storm goes in hand with business transformation and customer knowledge improvement all boosted by technological advancement.

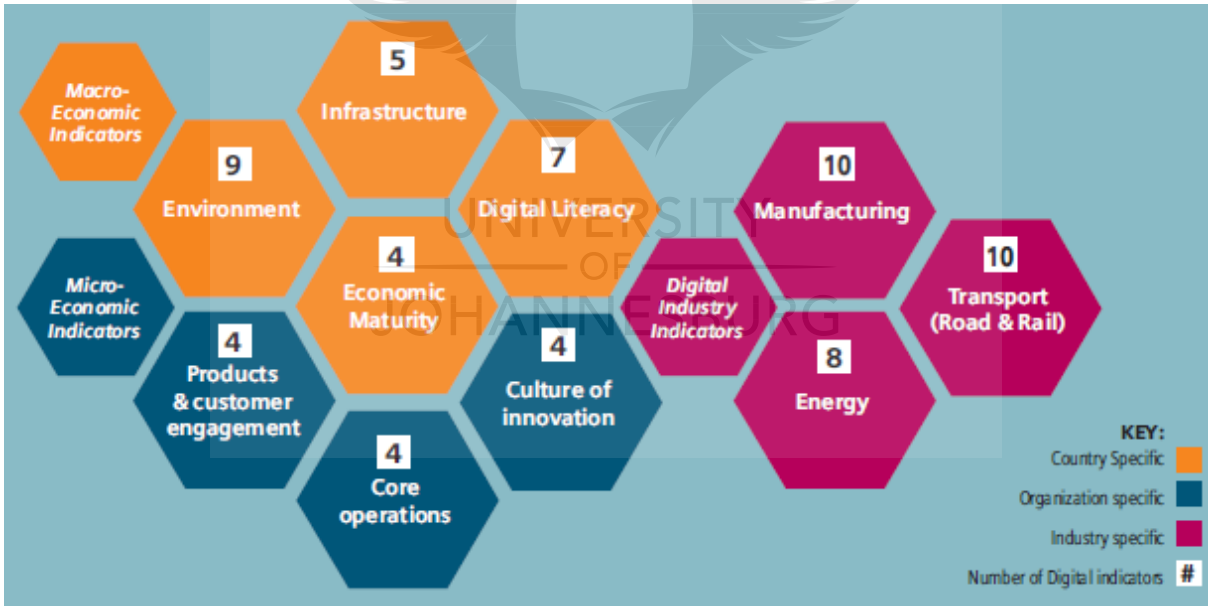
Digital Bank Characteristics

Digital bank is characterised by connectivity, intelligence, agility, and social responsibility. Connectivity allows integrated payments, multichannel banking through e-commerce, mobile Apps, tablets and so on. Digital intelligence involves artificial and emotional intelligence that enable big data management, digital identity, monetisation, and smart banking. Since the environment has become dynamic with digital change, agility is the key to digital resistance. Automation, virtualisation, new payment methods and cloud banking. On the other hand, digitalisation has affected the social side of the society through crowdfunding, social networking, and social medias. Corporate as well as banking governance are the systems that monitor the actions, policies and decisions in alignment with business goals and objectives while measuring associated risks. Regarding the key role of IT systems on the digital era, company emphasis on IT governance to facilitate integration between business and IT and optimise costs, resources as well as company values. Regarding the amount of digital creation and innovations, digital disruption contributes to the environmental change. Pohl and Finkbeiner (2017) conducted a research on the implications of digitalisation for sustainability and the environmental challenges associated with digital services. They pointed out that environmental assessment of ICT should follow a life cycle approach in order to meet the expectations of green ICT and ICT for green. In fact, resource usage and the overall energy demand has continuously increased over the last decades due to the numbers of devices, ICT infrastructures and digital services used worldwide. How to protect complex and interconnected world against enabling effects of ICT storm? Estimation of ICT infrastructure, integrating rebound effects, resource use and environmental degradation in addition to social impacts consideration are the challenges linked to the direct effects of ICT towards sustainability (Pohl & Finkbeiner, 2017).

2.2.1.2 Technological innovation

Technological innovation includes smart technologies, IT innovation and analytics. IT innovation includes system architecture that hosts systems as well as data security and business

integration by means of enterprise application integration using a specific business process reengineering applicable to system integration. The growing influence of mobile and internet providers teaches customers a lot about electronic products as published by PWC (2018). Banks should continuously upgrade their services to impress and gain customer's confidence. Heinonen (2007) designed a conceptual model that explained online banking service values that banks can offer. He found out that online banking service delivers technical, functional, temporal as well as spatial value to the customer. The need of sourcing new revenue streams has led organisations to look deeper than only focusing on cost-saving from business change. "Innovations are new things applied in the business of producing, distributing and consuming products or services' as defined by Betje (1998). According to DTI (2004), innovation is a successful exploitation of revolutionary ideas that renew inventions through diffusion in other fields. Technological innovation involves new solutions and breakthrough using smart technologies. According to Siemens (2017), digital maturity can be assessed using macroeconomic, microeconomic, and digital industry indicators such as culture of innovation, and digital literacy as depicted on the figure 2.3 below.



Source: Siemens (2017)

Figure 2.3: Digital maturity assessment tool

Macroeconomic indicators

- Environment: Digital protection, business, and regulatory environment
- Infrastructure: Access and use of internet through ICT affordability
- Economic maturity: It is about complexity, size and growth using GDP per capita.

- Digital literacy: It is about skills, digital training, and digital tools usage.

Microeconomic indicators

- Product and customer engagement: Digitalisation connect organisations with their customers across various products.
- Core operations: This is about digitalising business operations by providing digital tools to perform daily tasks. It refers to the ability to create and analyse data and information to manage operations through system integration.
- Culture of innovation: Culture of innovation is related to company' leadership and talent handled by the top management to deliver organisational objectives.

South African banking sector

Since the advent of the liberalisation in South Africa in 1994, new market entrants and internal changes besides external changes coming with globalisation, technological innovation and customer intelligence have been observed in the financial institutions sector. However, South African banking industry has remained oligopolistic with only few banks leading the completely financial market sector. Previous researches have been conducted in the field of banks by Bakos, Lucas, Simon, Viswanathan, & Weber (2010), Wang, Greiner, & Aronson (2009), Tallon (2010) and many others. In the fields of brokers, exchanges and real estate research were done by rowston and Myers (2004) and Bakos et al. (2010) among others. They all focused on business relation with the customer with no emphasis on the key part that is the role on information and technology and the associated strategies. However, research on electronic markets have been done using IT infrastructure with practical application on case studies. Evidence showed that some sectors are not that impacted with the technological change compared to others. According to Lehmann and Sydow (2015), combination of analytics, technology, data process/user cases, business impact and mobility are the actual components adding value to the digitisation. They argued that successful digitisation factors comprise performance management, processes, data management, technology/skills and culture. They equally argued that critical elements that characterise digital enterprise are interconnection, intelligence, agility and social. This underlines that digitalisation is mostly about online technology and Internet of Things leading to the automation applicable to any specific economic domain. From intelligence to technology platforms, digitalisation disrupts traditional ways of doing business through transformation. Disruption in the traditional businesses is caused by the introduction of automation, cloud computing, big data, and artificial intelligence.

Technological advancement goes in line with competition increase in the banking industry as well as new and strict regulations. Dependencies on telecommunications providers is a big constraint that banks need to manage as part of the governmental requirements to protect the financial sector. New competitions such as new payment services and methods developed by new technological companies constitute a threat for banks as financial services providers. Furthermore, there are new financial technology companies named "Fintech" that compete with banks in the economic sphere. According to bearing Point (2018), "Banks are spending billions of euros digitising back-office functions and customer services in an attempt to cut costs, improve revenue, and attract and retain customers". But the matter here is to know if the banks are following the right track to bridge the gap and thus limit influence of fintechs. In this regard, they conducted study on European banks to find out how they are applying digital technology on the daily banking services. They concluded that banks should apply the following tips to meet and benefits from the digitalisation process:

- Consider all business areas of banks and link all their value chain.
- See digitalisation as an opportunity to boost growth.
- Engage with new market entrants (Fintechs) and stay competitive.
- Develop digital innovation through culture of openness and receptiveness.
- Increase IT security.

They realised that banks are exposed to major challenges such as high interest income, tougher regulations, growing competition and demanding customers. Despite these constraints that banks cannot always control, it is advised that banks should institute continuous interaction with customer at every channel point. Although it is known that advantage digital can enable cost-cutting, banks should define exact critical points that require improvements. According to BearingPoint (2018), banks must specify digital focus areas in which technological change should be first implemented. Figure 2.4 below shows that digital focus areas can be the structure and culture, new employees, new IT infrastructure, automation of processes and internet and mobile platforms.

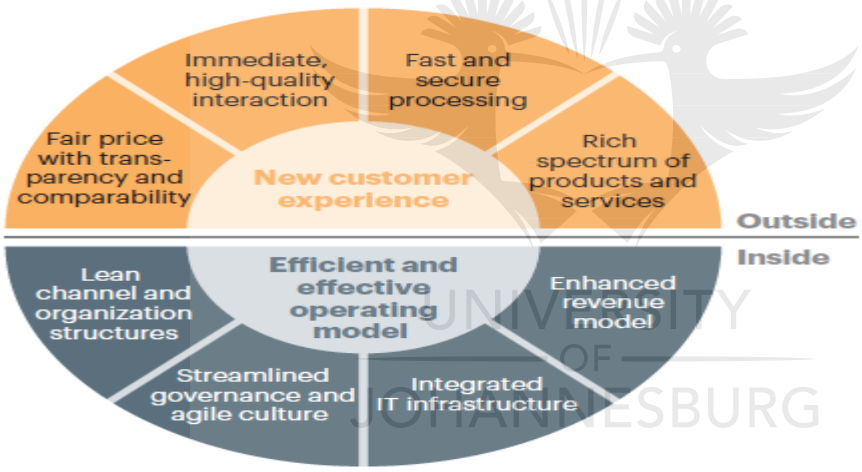
Source: BearingPoint (2018)

Figure 2.4: Digital focus areas

Culture cannot be established at a departure point because it is not a punctual point but a habit that grows overtime with the migration to the digital transformation. Additionally, the need of new employees is questionable unless they are hired to support existing staff and build change culture. it is efficient for the company to upskill existing employees especially because digital skills are scare in the job market. Moreover, existing employees already know the structure of the business.

2.2.1.3 Digital customer experience

There are considerable challenges in the digital banking journey due to the customer knowledge improvement. Although getting digitalised means going paperless, it is mostly about efficient service delivery through improvement of customer experience. Concerning the knowledge that customers acquired from the competition and social medias, wise digital banking offer services based on both customer experience and effective operating model as depicted on the figure 2.5 below to deliver the related service (Atkearney, 2018).



Source: Atkearney (2018)

Figure 2.5: Digital banking approach

On the outside, digital banks gain customer loyalty through fair price based on transparency and comparability, immediate and high-quality interaction with the customers, fast and secure banking processing and finally through large spectrum of banking products and services to be ahead of customers' expectations. From the inside, the following elements pertaining to the efficiency and effective operating model point explain how banks achieve customer satisfaction. Customer satisfaction is achieved through lean channel and organisational structures to reshape business model for effective service delivery; streamlined governance and flexible culture; Combined IT infrastructure and big data management tools and Enhanced

revenue model through value-added services. Figure 13 above entails that digital banking optimisation is reach through combination of both new customer experience form outside and efficient operations model from inside. However, customer centricity approach leads to deep and extra customers insights going beyond predefined banking spectrum. It is important to consider the strengths and the weaknesses of the banking operating structures before embarking to the principle of customer satisfaction at any cost. Banks should cautiously manage challenges and risks associated with the digital move while seeking more banking services to increase the convenience and value for the customers. Survey conducted by Atkearney (2018) in USA showed that 93% of the participants used mobile apps suite, 69 % like electronic wallet solution and 66% go for new personal finance tool. Their further analysis regarding personal financial management tool showed that only basic functionalities of the products namely automated expense, peer comparison, automated product recommendation and predictive capabilities are used. These findings suggest that processes of digital banking should go in hand with customer capabilities in understanding and using the products. Other innovative digital solutions such as artificial intelligence, video functions for advisory services, crowdfunding, peer-to-peer payments, and social investing remain immature for a long duration since customers are not even aware of them. A well-planned product innovation should not lead the bank to financial lost or too long return on investment (ROI). In a real banking world, outside achievements have been already met and is in a maturity stage going forward. Yet, inside solutions and methods still need to be implemented because the degree of disruption is high, and it requires specific and progressive management. Less branch visit and more online banking highlight digital journey stage embraced by banks. In order to survive from the digital storm, some banks are adopting a Greenfield approach by setting up quick processes, integrated systems and agile organisations while measuring risks and opportunities (Atkearney, 2018).

2.2.2 Business Process Reengineering (BPR)

2.2.2.1 Business Process Management

Management of business has taken another approach since the globalisation phenomenon and the dynamic environment took place. Methods and mechanisms of running business are no more stable but must be continuously reshaped to meet the volatile environment requirements. It is therefore up to the business to be visionaries and thus orientate organisation goals accordingly. That is why Harvey (1995) said that businesses should know their vision and mission to optimise benefits of the effective business management. Evidence showed that many companies are declining since the start of the digitalisation because of a lack of well-

restructured business management approach. At times, a part of the stakeholders is not involved in the process and human resources are not ready for the change. According to Lampathaki, Koussouris and Psarras (2013), the overall business through functional units should be part of the business management objectives related to business reshaping and business value creation. Organisational business management techniques should be decentralised to all functional units for better management and controls. Systematically tasks should be designed to clarify business processes objectives at every departments of the business and thus facilitate management of the business.

2.2.2.2 Business Management Methodology

Effective business process management follows a specific methodology that guide the step-by-step implementation. In any case, standard BPM methodology should comprise four steps namely process identification, update of the as-Is process analysis, design of the To-Be processes and lastly the To-Be process test and implementation (Phiphopsuthipaiboon & Boonsiri, 2016). Kai and Anderson (2004) established that business process change should start with vision, assessment, and alignment, then plan mastering and design and finally the implementation and operation phase. Many authors researched about methodology of business process management. The bottom line is that there are a lot of challenges linked to the implementation of new business processes because people resist to change, top management do not always have the real picture of the business at the functional levels. Furthermore, process boundaries are difficult to establish since they are all related from one department to another. Evidence showed that one business process model cannot be executed in an environment different from the one where it was designed. Therefore, Davenport (1992) clearly established that: "...structured, measured set of activities designed to produce a specific output for a particular customers or market". This suggests that companies and organisations should design their own processes while targeting the appropriate market without following benchmark approaches.

2.2.2.3 Business Management Measurement Tools

Business process implementation uses specific tools to measure the accuracy of the methodology applied in fulfilling customer needs. In a standard way, most of the businesses use the SIGMA method for analysis and monitoring (Aguilar, 2004). Other companies prefer the modelling techniques such as data flow, Gantt chart flow, flow chart and workflow. Whatever the case might be, Yoo (2010) advised that it is preferable to build new process modelling to manage new business processes using integration between the legacy systems,

database and the new application that will host the new business processes. Organisations follow specific business procedures to execute functional tasks. Business functionalities need to be continuously updated to meet customer satisfaction. Given the importance of global adaptation, banks as well need to upgrade their business process to achieve digital constraints.

2.2.2.4 Change management

In today's globalised world, change is common in the business ecosystems and requires to be mitigated accordingly. Considering the volume of innovative thinking and digital practice, it is important for every company that has a long-term goal to have a specific department dealing with change management. According to Aldrich and Martinez (2001), globalisation and digitalisation come with new technology and innovation challenges that need to be properly handled for business sustainability purposes. Reengineering existing business process brings considerable change on the business approach and the overall organisational structure. In order to attend to the matter, change needs to be managed properly to not deviate from the vision and the mission as well as not breaking beliefs and values that the company had first defined.

IT revolution is a business driver and thus constitutes a tool for the competitive edge (Porter and Millar, 1985) through banking services, productivity growth, risk and change management. They argued that IT investments should be done at internal level following business models, regulatory, productivity and risk management requirements and at external level through digital financial services. Dealing with today's change is mostly about aptitude to understand and communicate with the customers and understand customer' behaviour. Compared to traditional clients who only care about their money being safe at the bank and products delivery by organisations, digital natives have changed the game in all sectors. Digital customers look for easy connectivity through internet, devices and social networks, mobility, flighty (less loyalty) and are more demanding (Beziade & Assayag, 2014). Using connectivity platform and smart devices, customers can shop, banking and solve business concerns online through mobility management.

Concerning the autonomy developed by the millennial clients, well-informed banks have adopted a strategy of cost flexibility and autonomy positioning. From evolution to revolution, digital transformation seems to be a straightforward event without blockage. Yet, digital penetration is an imperative event forcing itself across all sectors of the economy. Customers as well as service offers are looking for simplified delivery process through flexibility and agility to achieve time optimisation. On the bank industry side, customers expect their

individual portal to be tailored as per their profile to enhance self-service. It is a form of business personalisation to particularly pay attention on customer requests. Research conducted by Heinomen (2007) showed that digital evolution has created services such as electronic money issuance, customer management, protection and experience that constitute the overall change going on.

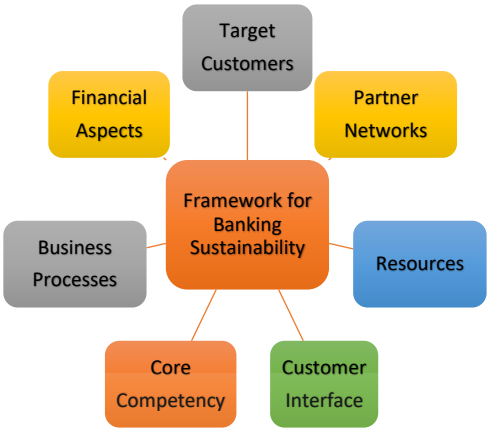
2.2.2.5 Business Process Reengineering

The advent of the 4IR has catalysed the reengineering of existing business management processes. From the "As-Is" to the "To-Be" management processes, technological innovations are the bridge towards efficient management. Hammer and Standton (1995) found out that business process reengineering is "The fundamental rethinking and radical redesign of business processes to bring about dramatic improvements in performance". This suggests that financial institutions such as banks should redesign their existing process regarding the increase of digital reshaping in order to improve their performance through profitability increase. Hammer and Standton (1995) argued that improvement on organisation performance goes in hand with redesigned business processes that are in alignment with environmental change. Sudhakar (2014) argued that relevant business process transformation is about acknowledging the existing business situation, identify and amend the required process through laboratory testing. The truth is that business should not rely on testing simulation because the market environment is not stable, and it evolves every day. Some business elements such as values and beliefs cannot be tested whereas they radically affect change process (Hammer & Champy ,1993). Albany (2006) found out that effective management of the business processes includes process design, information system platform, human resources, change management and finally the incremental enhancement. It also happens that upgrade of business process is successful when each process has a guardian who makes sure that business processes remain aligned to the overall company' goals.

2.2.3 Banking performance Framework

It is very important for people and businesses to figure out physical dynamics, mechanisms and properties of frameworks or models before execution (Haugh, 2010). The National Cybersecurity Policy Framework (NCPF) designed by the Ministry of State Security guide security measures in South Africa. Additionally, the Protection of Personal Information (POPI) Act guides privacy of data in South Africa. Figure 14 depicts the proposed framework for the banking sustainable business model as designed by Saeed, Printer, Mosavi, and Semperger (2020). They argued that a successful implementation of banking sustainability should include

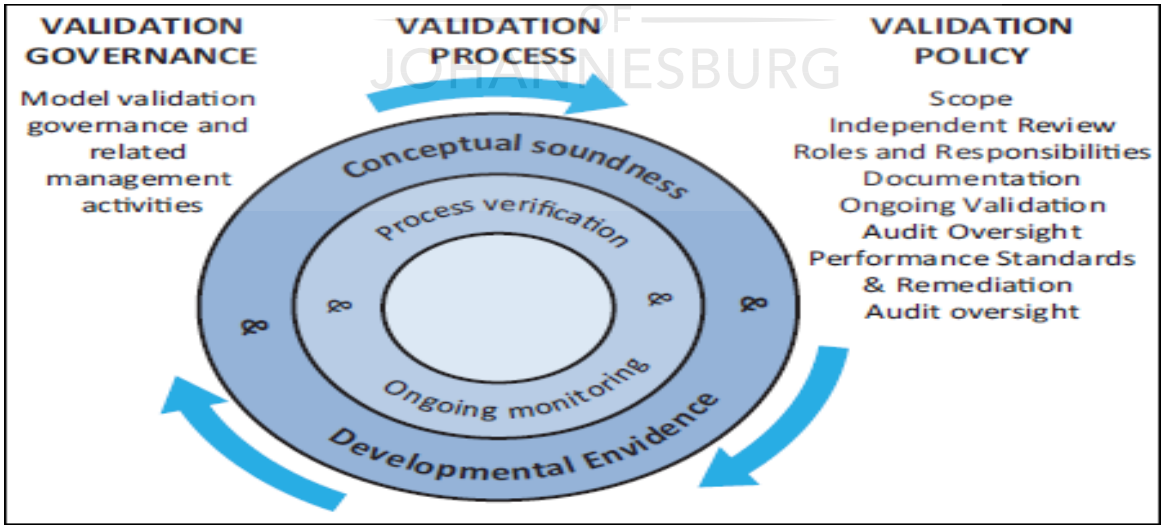
the following elements namely targeted customers, network providers, resource, core competency and customer interface. Additionally, they added that the primarily importance should be given to the business processes, the technology platform, and the financial aspects.



Source: Saeed et al. (2020)

Figure 2.6: Proposed framework for the banking sustainable business model

The South African journal of economy and management sciences published an article regarding best practice model validation framework for banks. According to the authors, the model validation framework is a component of model risk validation that includes model validation governance, policies and processes (Pieter, Larney, Eben, Gary, & Tanja, 2017). They came out with the proposed framework as displayed on figure 2.7 below.



Source: Pieter et al. (2017)

Figure 2.7: The proposed model validation framework

2.2.3.1 Banking Performance Framework Policies

Effective business framework has sound policies attached to it as guidance for the programme validation. Study conducted by Rajalingham (2015) established that framework policies should contain the following components:

- The scope
- Independent review from the external stakeholders
- Roles and responsibilities
- Corresponding model documentation
- Recurrent framework update and validation
- Identification of performance standards and mitigation plans
- Internal and external audit validation

2.2.3.2 Banking Performance Framework Processes

According to Pieter et al. (2017), framework policies are followed by a process of framework validation that includes the following elements:

- Conceptual reliability and developmental evidence
- Process verification and constant monitoring
- Result analysis

2.2.3.3 Banking performance Framework Validation

Validation programme of framework involves statistical techniques and methods to check the soundness of the framework implementation. This entails that framework policies as well as framework processes should be measured for efficacy purposes.

2.2.4 Banking Performance

Many South African banks have had a rise on revenue growth since they are moving towards electronic channels (SARB, 2018). This implies that banking performance is associated to the level to which a bank is willing to embrace digitalisation. Study conducted by Moinak and Kayal (2017) regarding digitalisation impact on economic development and trade in India revealed another side of the story. They found out that digitalisation has improved performance on service sector as well as micro and medium enterprise segments through augmentation of operating income, reducibility, and profitability. Regarding the key role that financial services play on the economic growth, they have always been seeking to be at the front up of technology upgrade and innovation. Nevertheless, social medias and mobile devices take advantage on

financial institutions by forcing the customer to get upgraded and be ahead of the change. Additionally, study done by Ritika and Tanima (2015) about the digital revolution in banking showed that customers have advanced knowledge on various products in the market through use of smartphones and internet. According to Ritika and Tanima (2015), banking transformation should go in hand with customers leading change, innovative customer solutions, reconfigured distribution, process digitisation and change of workforce. Booz & Company (2013) argued that ubiquity, affordability, reliability, speed, usability, and skill allow to measure the digitalisation level of companies and organisations. They also came up with argument stating that there is an effect of digitalisation on economic growth and job creation.

Performance of South African banks can be measured through profitability, liquidity and credit ratios as established by Kumbirai and Webb (2010). Van der Westhuizen (2014) and Monea (2011) on the contrary stated that profitability ratios such as Return on Equity (ROE) and Return on Assets (ROA) are the only principal ratios among various financial ratios that inform more about an organisation performance level. Regarding the speed linked to the new tendency of digitalisation, banks should be committed to safety and trusted products as well as services to smoothly drive the transition. Although banks are still recovering from the consequences of the recent financial crisis, it is imperative to quickly pick up the pace on digital evolution. According to Deloitte (2018), digital banking performance will be disrupted by the level of customer experience gain through new digital channels and features such as smart phones, tablets and smartwatches by 2021 that conditioning relationship between banks are their customers. With regards to the change on the market environment, banks are now dealing with Fintech, non-traditional competitors and fully digital banks all affecting capability of the local banks to offer innovative functionalities compared to old practices (Deloitte, 2018). In the 2015 edition of digital banking benchmark defined by Deloitte (2018) following Luxembourg retail banks, it appears that banks should work and invest on the five following tactical areas of development to offer sophisticated online services and build strong digital channel strategy and thus improve performance:

- Automated account allowing customer empowerment through free upload value-added documentation and banking requests.
- Implementation of advice features considering each user profile though use of robot-adviser and analytics.

- Development of smart money management tools to analyse and categorise account movements as well as forecasting tool to estimate upcoming incomes and expenses on each user account.
- Customisation of service and continuous assistance to fulfil clients' individual needs.
- Improving coverage of cybersecurity features to facilitate customer and user experience.

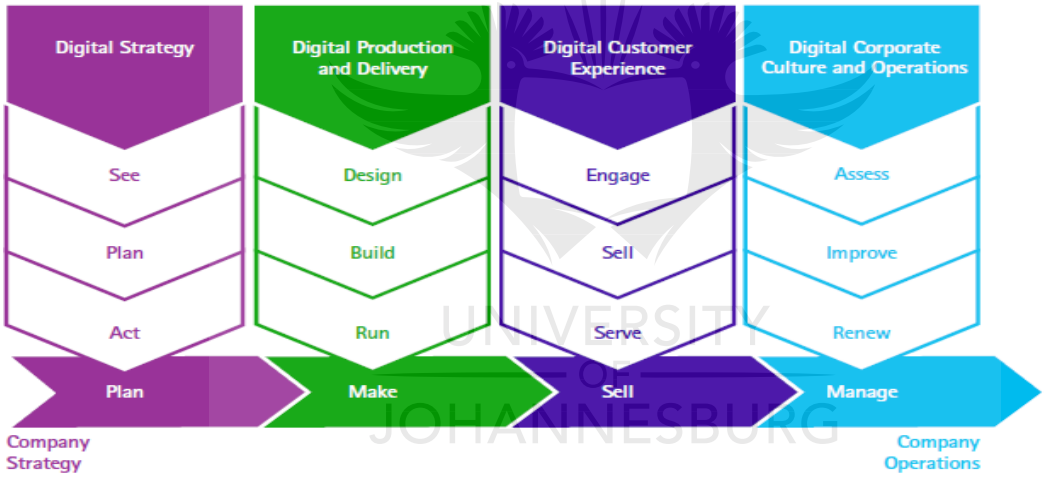
Regarding the multiple criteria that can be used to assess statistical variables, many authors choose to combine them in a dimension to facilitate research data collection. Deloitte (2018) defined eight dimensions representing more than 230 criteria as benchmark to highlight daily services that banks should offer to their customers through digital channels such as public website, web banking and mobile applications to increase productivity. Table 2.4 below displays dimensions as groups and the number of criteria considered under each dimension to collect information that near or far can affect business performance. Evidence showed that questionnaire with too much criterion for one dimension can compromise the accuracy of responses from respondents.

Table 2.4: Benchmark dimensions for customer journey

Dimensions	Description	No. of criteria
Onboarding process	Friendly online account opening process	17
Content and functionalities	Assessment and improvement of value-added features	100
Design and ergonomics	Improvement of the overall stakeholders' experience	27
Navigation	Ease to find information on the website/Application	12
Cybersecurity	Regulation and protection of online services	27
Advice	Personal management tool through online profiling	17
Credit	Online credit demand and guarantee management	17
Account closing	Online closure and reasons assessment	8

Source: Deloitte (2018)

In conclusion, Deloitte (2018) found out that Luxembourg banking market are not performing well and do not develop differentiators in terms of online services. This suggests that digital disruption is still not well-handed by local banks that have not improved services and features on their digital channels. A developed economic such as Luxembourg should not struggle to pick up the pace with digital disruption. However, evidence showed that performance is no longer related with the number of years in the business but by how adaptable a company can be whatever the change in landscape. Additionally, aptitude to get digitalised is important in a sense that new competitors such as non-traditional and Fintechs easily find success and prosperity in the industry. According to Accenture (2018), digital organisation should comply with the following digital performance index (DPI) as represented in figure 16 to integrate the full breadth of business activities based on action points per pillar structure namely digital strategy, digital production and delivery, digital customer experience, digital corporate/Culture, and operations.



Source: Accenture (2018)

Figure 2.8: Multi-pillar of digital integration

The four pillars follow the below patterns to meet company's strategies and operations.

Plan: It is about understanding the digital trends and how it reflects on the strategic plans and implementation.

Make: It is about assessing the use of digital technology in innovation, production and delivery

Sell: It refers to the customer experience evaluation across digital channels

Manage: It is about examination of the digital technology presence and mind-set in corporate culture and internal operations

The main goal behind integration of business activities is the optimisation of financial performance. But the question is about how to efficiently measure banking financial performance? Accenture (2018) defined high performance business framework (HPB) based on five equally weighted metrics set to measure business position in the industry as explained below:

Profitability: this metric is measured by the return on invested capital (ROIC).

Growth: It is measured by revenue obtained over a certain period.

Positioning for the future: It is measured by the level of change of future value over a period.

Longevity: This metric is measured but the CAGR of total return to shareholders (TRS) over a period of time in years.

Consistency: Consistency in growth is measured by the profitability and positioning metric over several years predefined.

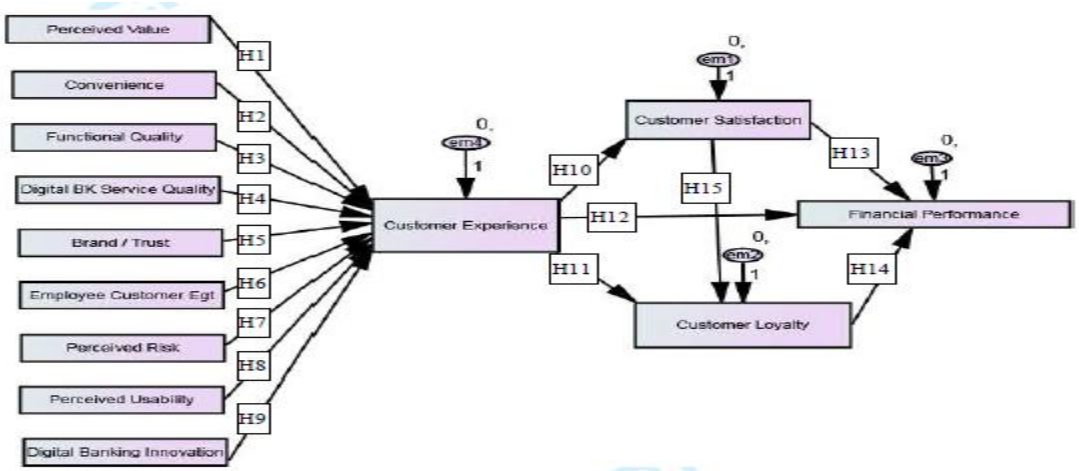
Source: Accenture (2018)

Figure 2.9: High performance business criteria

As a way forward, banks' digitalisation is a business performance enabler that needs to be considered as a priority. Over time, efficiency of banks will be a proven element that banks have coped with the challenges associated with the digitalisation. According to Wood (2007), inefficient banks struggle to follow the change flow occurring in the market sector. Sometimes the issue stands on identifying the right tool to measure and evaluate efficiency. Study

conducted by Gronau (2009) showed that efficiency can be analysed and measured at production, operational, profitability and intermediation level.

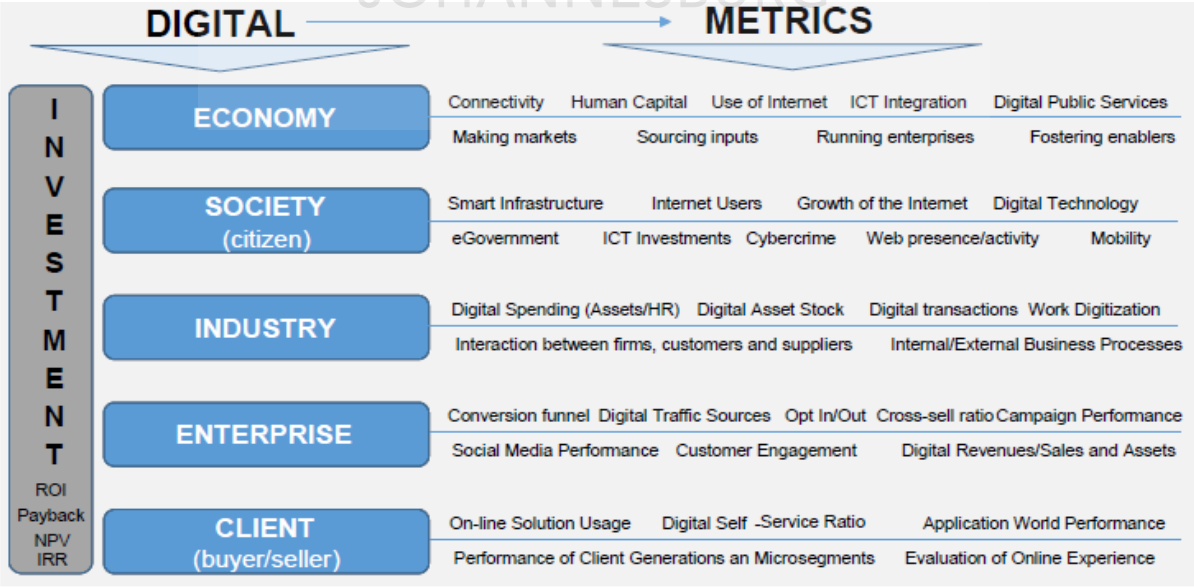
Some authors such as Ramdhane (2013), Muhammed et al (2013) and Happiestminds (2014) studied the effect of digitalisation on productivity in the financial sector. They argued that globalisation and digitalisation constitute economic forces of change that deserves some attention. In order to achieve digital incomes goals, organisations should build up digital ecosystems by means of digital platforms that meet the business requirements and is flexible. According to Banker, Chen, & Liu (2009), financial services need to develop new digital and adaptable products to improve their operating models and therefore build customer' loyalty. Moving from traditional banking services to digital financial services, banks are now offering innovative services to customers such as internet banking, smart phones-enables solutions, innovation and technology-driven solutions, electronic money models and digital payment platforms (Tariq & Weigand, 2017). Banker et al. (2009) studied the effect of IT-related service channels on firm performance. He discovered that the use of internet banking improves cost efficiency but not revenue efficiency. This means that the return on money invested on the new technology of internet baking is quite low at this stage. However, it is important to go through such lost for now in order to be able to meet future trend upcoming and long-term competitive advantage. Banks should develop internal operations strategy regarding corporate governance, risk evaluation methods, credit assessment procedures, staff qualification and internal control process. It is likely perceived that digitalisation brings in new customers that were not previously doing bank activities and thus increase performance of banks through cost efficiency. But, for financial service providers, relationship between related cost and benefits needs to be weighed against the welfare changed among current and potential users as pointed out by Harigaya (2016). He argued that customers who have easy access to transaction via mobile banking become more sensitive to any increase on transactional costs and further reduce existing costs. Mbama (2018) defined a conceptual model symbolising dependent and independent variable influencing financial performance of UK banks as depicted on the figure 18 below. He established that financial performance depends on customer experience, loyalty, and satisfaction. Furthermore, he argued that customer experience can be measured by the functional quality, the brand, perceived risks and digital banking innovation among others.



Source: Mbama (2018)

Figure 2.10: Conceptual model for UK bank performance

It is true that IT or ICT enhances bank financial performance as the appropriate platform. But it is important to know how it happens exactly. Performance increase can be due to a decrease of operational costs (Cost effects) or to the scale of economy linked to transactions between customers in the same network (Network effects). Sometimes, it is difficult to find the exact metrics that effectively measure digitalisation due to the difference on dimensions and end user's education level. Following digital economy, society, industry, enterprise, and client's dimensions as defined by Kotarba (2017) on figure 2.11 below, there are many key metrics such as the use of internet, ICT investments, customer engagement among others are known as key performance metrics to measure digitalisation.



Source: Kotarba (2018)

Figure 2.11: Digitalisation dimensions and their primary metrics

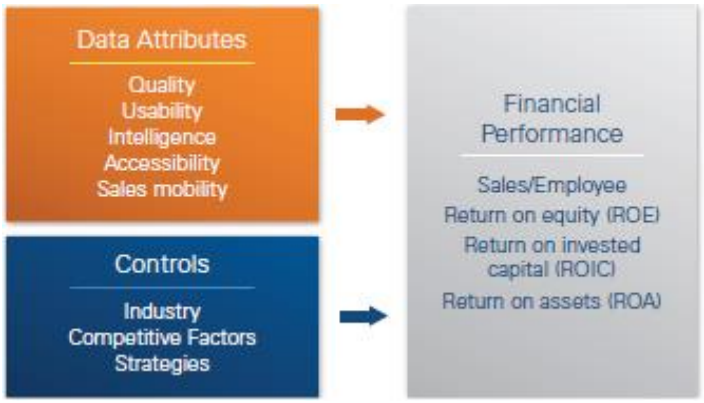
The defined metrics cannot be applied to all organisations in a sense that market conditions and sector rules are not always standard. Moreover, the degree of impact of digital metrics is not the same in all businesses.

2.2.4.1 Performance measurement

Besides chasing globalisation and digitalisation as a strategical goal, companies should be able to measure the risks associated in a local context. Localisation here goes in hand with the alignment to the country legislation, environmental culture and ethical considerations that represent country system values. Performance measurement can use financial or non-financial elements. According to Lotto (2018), operating efficiency depends on capital adequacy, bank size, profitability, non-performing loans, and loans to deposits. Tariq and Weigand (2017) run a comparison analysis on existing researches round the world in the field of digital financial services and the impact on organisation's performance. Technological advancement affects all areas of the economy especially financial services and banks through increase in profitability. Study of Jordanian banks showed that there is a dependence on the capital investment to increase E-banking and E-channels to improve bank profitability (Nawafleh, 2015). Besides financial innovations such as debit/credit cards, ATMs, mobile and internet banking, commercial banks in Kenya have adopted the approach of using agency banking to increase their financial performance (Muiruri & Ngari, 2014). In Nigeria, Muhammad, Gatawa and Kebbi (2013) found out that the use of information, communication and technology has a significant and positive impact on return on equity on the overall banking industry. This suggests that the financial performance of Nigerian banks has been measured using return on equity only. They further argued that it is not efficient for banks to continue investing on additional ICT devices or infrastructures but to optimise the use of existing ones. In Tunisia, banks' efficiency levels depend on bank size and managerial capacity compared to non-performing loan share that represents a source of inefficiency (Romdhane, 2013). The recent study conducted by Mbama (2018) on United Kingdom's banks examined the perception that customers have about digital banking based on their experience and the impact on the financial performance of banks. He found out that customer experience, satisfaction and loyalty are the main factors that enhance financial performance knowing that digital banking innovation, perceived value, employee-customer engagement, and perceived risk build up customer experience. Achieving performance goals is one thing and aligning them to business operations and services is another. In Brazil, financial services emphasis on information technology

governance to define rules and policies to meet new digital strategy and goals objectives (Barbosa, Rodello & Padua, 2014). Financial institutions' governance serves as well to assess financial results from the development of information technology and bank automation and make sure that business values are respected.

Improvement of organisational processes is one of the business enablers that boost corporate planning, strategy implementation and performance measurement as indicated by David (2005). Performance assessment allows to know if yes or no corporate planning has been incorporated into the business strategy and to evaluate the level of achievement. In association with IT systems as platform solutions, a suitable feedback as well as further previsions can be done automatically in real time. It is important to mention the accounting principles used to measure and evaluate business performance because legislation differs per country. International financial reporting standards (IFRS) conceived by the international accounting standard board (IASB) are applied in the case of standard reporting that suits different shareholders from different business governance. Besides international requirements, IFRS can be used inside the country to facilitate financial audits and comparability of performance between organisations in the same industry. This particularly happened in countries where there is no harmonisation of accounting principles defined per sector inside the overall country legislation. Corporate and institutions performance are generally measured by financial ratios. According to Smith (2001), corporate performance should be measured based on the mechanistic systems that include traditional financial measures and balanced scorecard as well as humanist systems that includes African Ubuntu philosophy, sustainability scorecard, business ethics and corporate governance. The balanced scorecard is a performance measurement that includes financial, customer orientated and operational measures. Barua, Mani and Mukherjee (2019) measured the business impacts of effective data following three series of performance measures namely financial, customer-focused, and operational impacts. They argued that customer-focused is an important performance measures in a sense that it reveals the ability to innovate, to create new products or services and to increase the number of customers. Barua et al. (2019) believed that the following financial ratios allow to evaluate financial performance of any business namely sales/Employee, return on equity (ROE), return on invested capital (ROIC), return on assets.



Source: Barua et al. (2019)

Figure 2.12: Financial impacts of data attributes

Sales per employee ratio reveals the company productivity per employee and the overall financial health. Although sales revenue generated by each employee informs about turnover, it is not that reliable in a sense that only the volume of operational costs can determine the retain earning known as profitability indicator.

2.2.5 Research in South Africa

Different scholars have carried out research on banking and digitalisation on financial institutions especially on commercial banks in South Africa. But they did not emphasise on critical points such as migration level, management of change in the sector, internal comparison between banks. The current study includes them since they are important in telling us about digital trajectory adopted by South African banks. All South African banks have adopted localised dynamics by introducing banking application to enhance banking transactions from the mobile devices. Besides the need of improvements, customers want to be ensured on the credibility, security and privacy of their information (Mukherjee & Nath, 2013). But digital platform on his own is a potential source of attacks by fraudsters that breach and disclose of customer's personal information (Wang, Greiner, & Aronson (2009). IT companies such as Samsung, Google and Apple are also developing mobile payments as part of their core activities. This suggests new entrants in the area of financial services creating threat in the banking sector in the South African context. In South Africa, banking supervision by the Basel committee emphasised on security risk and cyber defence as the premier concerns of banking embracing the digital transformation (SARB, 2018).

2.2.6 Research in Foreign countries

Research on the efficiency of African microfinance institutions in comparison with other microfinances around the world showed that foreign institutions lead world frontier technology compared to African countries (Azard, Munisamy, Masum & Wanke, 2016). Despite a little progress on technological changes observed on microfinance institutions in providing welfare and social outreach, research results showed that microfinance themselves are at the lowest level in the channel of financial institutions and only depend on donor organisations or individuals (Azard et al., 2016). This further suggests that the objective of poverty alleviation is difficult to be met because in each country, efficiency depend on geographical location, macroeconomic heterogeneity, strategic and socio-economic conditions. Study conducted by Setia, Venkates and Joglekar (2013) on local Indian banks regarding the impact of digital technologies on the customer service performance revealed that organisations should applied the concept of customer orientation capability and customer response capability to meet customer needs and expectations. They also highlighted the critical role of information quality to effectively perform these capabilities. One of the articles published by Deutsche bank (2016) argued that internet and mobile banking is the main channel of communication to improve vice-versa relationship between banks and their customers as well as on time banking transactions. In Denmark for example, agility and adaptability of work processes are simulated and tested in a specific application called DCR technological graph before implementation to reduce the level of the digital process complexity (DuBois, Portillo, Rhodes, Silverthorn, & Valentine 2011). Traditionally, newspapers were only done as printed version compared to the today approach developed by journalists and media groups. But nowadays, digitalisation in Russia has created an online version of newspapers based on the printed version (Pankin, Fedotov, Richter, Alekeeva, & Osipova, 2011). Later on, two Russian newspapers namely Komsomolskaya and Vedomosti launched another version of online newspapers on iPad and ePub, followed by the release of Android version of newspapers for smartphones (Korpoativnye, 2012).

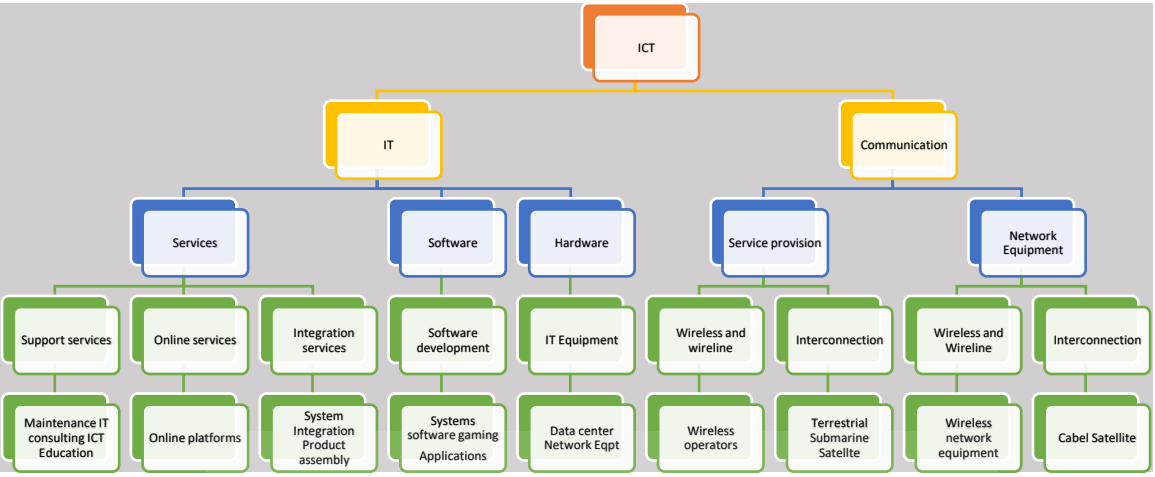
2.3 Empirical Framework

From the theoretical to the conceptual framework, results have been put together to build up the empirical framework. However, the current empirical framework will give more value to the contribution of the study. Investigating the importance of the digitalisation and the reengineering of business process in association with a valuable bank performance framework can contribute to optimise banking performance in South Africa. Following research done by

the BearingPont institute, South African hold the status of digital shy since they have automated banking processes. There is an impact of bank capital regulations on the overall operating productivity. Empirical analysis recently developed by Lotto (2018) in Tanzania showed that capital ratio is significantly linked to the bank operating efficiency. He further argued that besides financial stability, capital adequacy also prevents moral hazard issues between shareholders and debtholders. He explained how bank decision is limited by the increase and continuous change of regulations on capital requirements. Contrary to non-performing loan namely credit risk that cannot tell much about operational efficiency of banks, bank operating efficiency in commercial banks rely on capital adequacy. Lotto (2018) as well found out that it is important for banks to invest on advanced technological innovations to improve efficiency through diminution of operations expenses. Many expenses will be reduced or even disappeared with the globalisation and the digitalisation. It will be difficult for companies whose primarily products are physical to get them being digitalised. This suggests that such companies should use physical channels and develop new product lines using digital channels to remain competitive in the market. Organisations and institutions then need to redesign their core business because in a short period of time since it is predictable that product and service quality will be compromised due to the positioning hunt in all means. IT knowledge based, robotisation and core business changes as well as privacy and quality control are challenges to be mitigated in order to survival in the volatile environment.

Observations showed that digitalisation has reduced the level of unemployment, quality of life and improved access to knowledge in South Africa. Khan, Khan and Aftab (2015) argued that digitisation has affected the overall economy through cost effectiveness, easy data communication and lifestyle improvement. According to Yoo (2010), creation of digitalised products and services engender collateral issues and challenges such as the development of new products layers architecture caused by the ongoing spirit of innovations. This suggests that digitalisation do not only increase innovations but enhance products and services development in layers. Sabbagh et al. (2003) argued that policymakers should adopt a holistic and multi-layered ICT ecosystem perspective to build capacities to achieve digital plans as depicted on the figure 2.13 below. Apart from developing internal strategy to drive technological change, international companies have to adopt a different approach to avoid negative impact of the digitalisation out of their normal boundaries. Wautelet (2017) studied the impact of digital transformation on international companies with a case study on LEGO multinational. He found

out that digital business is not only about digitalising marketing and operations but mostly creating new customers channels and entering new global markets following digital leadership.

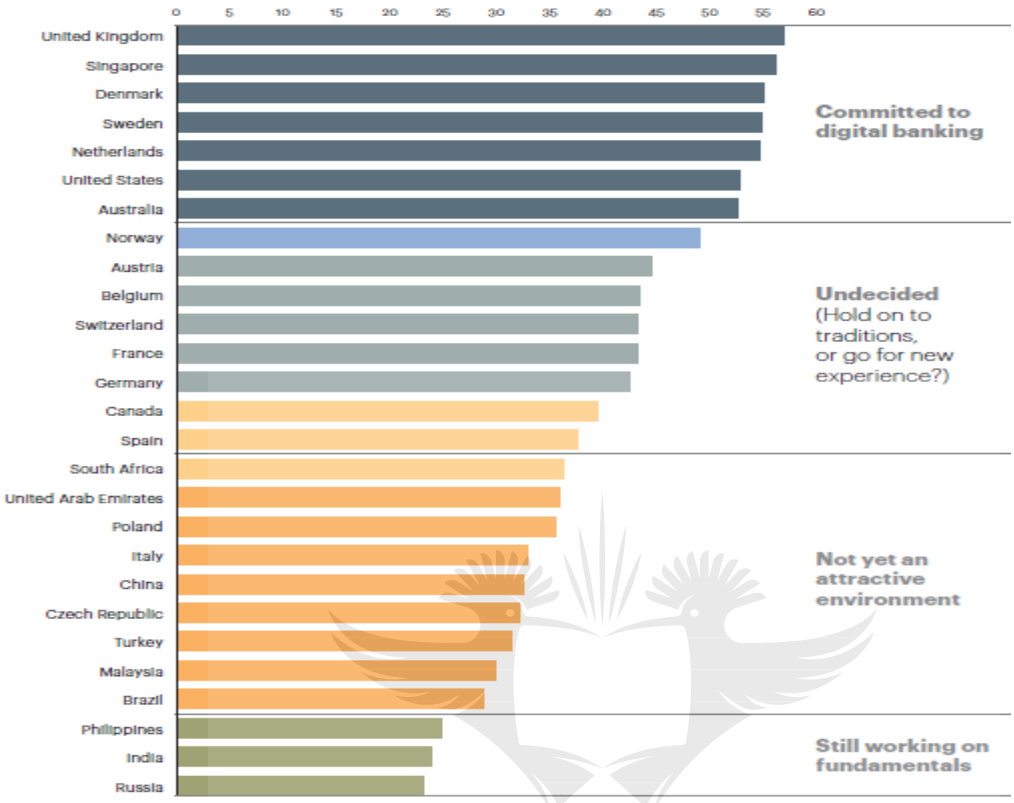


Source: Sabbagh et al. (2003)

Figure 2.13: Multi-layered ICT Ecosystem

This leads to the enlargement of business model scope and scale at operational and customer levels. Sabbagh et al. (2013) used economic, society and governance variables to measure the impact of increased digitalisation using specific metrics. They found out that there is a positive impact of digitalisation on GDP growth, job creation, innovation, transparency, and education. Research conducted by Atkearney (2018) around the world argued on how ready countries are towards banking digitalisation. They came out with a worldwide digital banking readiness index as displayed on the figure 22 below based on whether a country is committed to digital banking, undecided (hold on to traditional ways), not yet an attractive choice or still working on fundamentals. They found out that commitment to digital banking approach by the top ten developed countries is based on banking capabilities, market dynamics, customer behaviours and the regulatory environment. Countries like India and Russia are still working on fundamentals compared to South Africa for instance that instead is slow in picking up the pace due to an environment not yet fully attractive. In normal economic conditions, it is up to big banks to be the primary leaders and players of digital banking implementation then follow the followers. Figure 2.14 suggests that in South Africa, the big four banks should be the leader of the digitalisation of the banking sector followed by the other small and foreign banks. Australia is one of the ten countries in which banks are fully digitalised, but the market dynamics and the customers are less ready (Atkearney, 2018). Although the picture is different, observations showed that customer as well as market condition can easily pick up the pace through proper

mentoring. In Switzerland instead, customers are ready for digital banking before banks themselves. Customer readiness is an important criterion to determine digital banking readiness in an industry or in a country.



Source: Atkearney (2018)

Figure 2.14: Digital banking readiness index

2.4 Conclusion

This chapter is about the review of literature guides the study through what have been done by local and external researchers regarding banking performance indicators. The review showed that the digitalisation, the reengineering of business processes and the use of performance framework are the critical elements to be considered in the journey of performance improvement during digital era. Although the digitalisation concept can take different avenues, the review of literature mainly established that it includes updated business strategies, technological innovations as well as customer knowledge improvement. In addition to the above-mentioned, this report considers complementary factors that have a strong influence on banking performance. The following chapter is about the conceptual framework that highlights the overall banking performance variables as established by the author.

CHAPTER THREE

CONCEPTUAL FRAMEWORK

3.1 Introduction

The previous chapter talked about theoretical framework as the theory that drives the current research. However, in practical by means of underground execution, theoretical framework is updated to fit into the real environment through conceptual framework. This means that besides critical points analysed in the theoretical framework, additional points will be added to build a completed framework that meets the overall digital requirements. Combination of concepts between the theoretical and conceptual framework build up a large spectrum around the banking performance indicators. This chapter focuses on practical digital factors that influence banking performance improvement.

3.2 Conceptual Framework

The current conceptual framework is based on a central theory that has secondary theories all compiled together to build the framework. Considering the innovation and the process aspects, Tsui (2003) assumed that "Digital Transformation (DT), being the latest trend for business transformation and organizational change, synchronises business processes and integrates information technology leading to operational efficiency and innovation which contributes to overall business strategy". In the same regard, Imgrund, Fischer, Janiesch and Winkelmann (2018) stated that requirements for digital transformation could be grouped in cultural, organisational, strategical and technological aspects that include expertise, organisational flexibility, involvement, digital strategy, IT strategy, security, collaboration and culture as detailed below.

Expertise: It includes It, data-related skills and the capabilities.

Organisational flexibility: It comprises the ability, scalability, and adaptability.

Involvement: It involves internal and external stakeholders.

Security: It is about formulating behavioural guidelines, risk management systems and defence strategy.

IT Strategy: It comprises the digitisation and automation, data integration and process orchestration.

Digital strategy: It involves goals, actions, and communication plan.

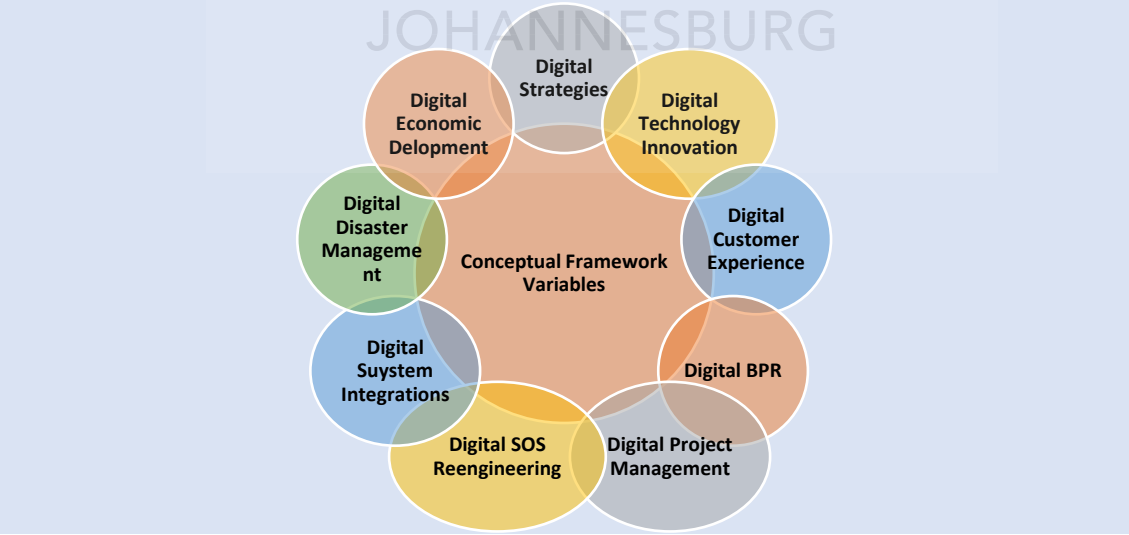
Collaboration: It is about modularising processes and activities

Culture: it includes creativity and risk-taking in addition to the training and education

Conceptual theories mentioned above highlight the following points applicable on each South African bank as foundation of the conceptual framework that will be elaborated in the up-coming sections:

- Digital strategies (DS)
- Digital technological innovations (DGTI)
- Digital customer experience (DCE)
- Digital business process reengineering (DBPR)
- Digital Banking performance framework (DBPF)
- Digital banking performance (DBP)

Besides the above-mentioned variables extracted from the conceptual philosophies, the current studies consider the following concepts that are equally important as building blocks of the banking performance. Optimisation of the productivity and the banking performance is influence by factors such as the Digital project management, Digital system of systems reengineering, Digital system reintegration, Digital disaster management (A case of the COVID-19) and the Economic development. Figure 3.1 depicts conceptual framework variables to be elaborated throughout the chapter.



Source: Own Compilation

Figure 3.1: Conceptual Framework Variables

3.2.1 Digitalisation Variables

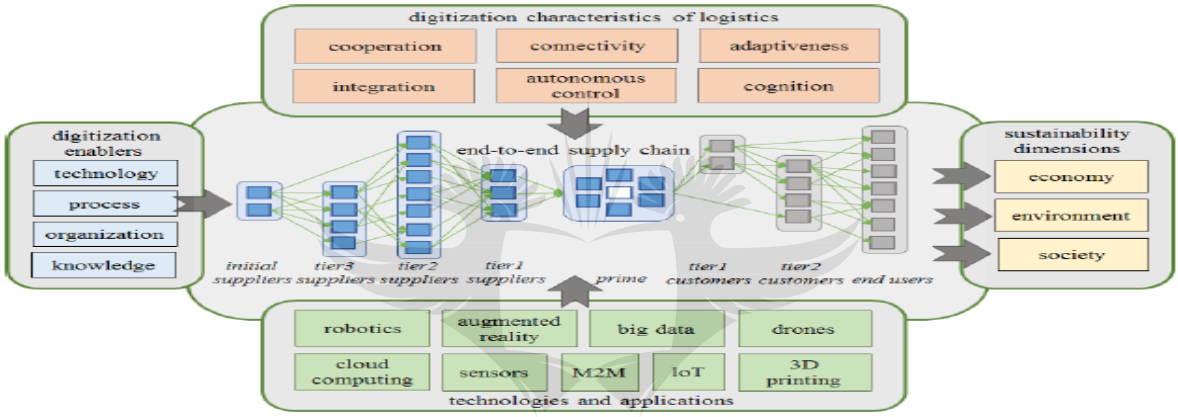
3.2.1.1 Digital Strategies

Digital strategy is about defining relevant strategy to survive in the current digital world full of continuous technological change. Contrary to the traditional time where strategic definition was only about setup of long-term goals and objectives to deliver unique mix of values digital strategy integrates future unknown change (Porter, 1996) . Based on the strengths, weaknesses, opportunities, and threat (SWOP) analysis, South African bank define appropriate strategies to survive in the business environment. Business strategies can be targeting integration, intensive, diversification or defensive goals. Digital transformation conjointly disrupts traditional business strategies through integration of continuous change, data management and virtual attacks. Digital strategies comprise differentiation, market positioning, market segmentation, customer and product centric, change-driven leadership and security-driven strategies. Diversification strategies are also applied on product development for differentiation and competitive edge. It also happens that banks go for joint venture with other financial institutions as a solution to resist to market competition. Sometimes, economic conditions brought banks to proceed with retrenchment and further to liquidation to pay back shareholders before final shut down. According to Päivi, Maarit, Jukka and Teppola (2017), the efficient way to embrace the digitalisation is to first position the company in the digital sphere while defining its digital business goals, drivers, and test alternative scenarios. Figure 3.2 shows that digital transformation process starts with the identification of the existing state of business and the setup roadmap for digitalisation before implementation and validation of technical changes.

Source: Päivi, et al. (2017)

Figure 3.2: Model for tackling digital transformation

Digital organisation and enterprises should have ability to adapt to the new ways of doing business by developing innovative culture through employee's creative thinking and leadership innovation to vehicle long-term growth. In the manufacturing field, study conducted by Kroll et al. (2018) showed that digital technologies improve production efficiency or innovative performance through use of classic automation although existing product life cycle did not yet reflect considerable change with the use of smart technologies. In logistics domain, sustainability impact of digitisation enables real time connectivity between stakeholders' systems and processes as well as introduction of multiple products variants (Kayikci, 2018). He designed a sustainable digital logistics ecosystem that showed the impacts of digitalisation on logistics following sustainability dimensions as depicted on the figure 3.3 below.



Source: Kayikci, 2018

Figure 3.3: Sustainable digital logistics ecosystem

In summary, digital banking strategies that form part of the conceptual framework are the differentiation, market positioning, market segmentation, change--driven leadership, customer and product-centric and finally the security-driven. Innovation-orientated approach comes with major challenges that organisations need to manage in order to avoid internal resistance to innovative culture and to the change. Limited market regulations, shadow IT and cyber-attacks, and the inappropriate architecture and infrastructure. Whatever the case might be the best practices of dynamic business strategy, risk management, leadership innovation and creative thinking in addition to the supportive infrastructure and architecture in business innovation will help to avoid and limit impact of innovation challenges.

3.2.1.2 Digital Technology Innovation

IT revolution is a challenging business driver and thus constitutes a tool for the competitive edge both internally and internationally (Porter and Millar, 1985). Digital era is fully dominated

by an increase of technological innovations in each area and functional units of the business reorienting organisational goals. The effects of automation bring transformation in every domain of the economy besides change on people and resources. Technological innovations are the building blocks of digital change through robotics, drones, big data management, 3D printing, sensors, cloud computing and so forth. This suggests that technology, process change, people and resources in the organisation enable a successful trajectory of business transformation. Companies are forced to innovate to adapt and survive as part of the requirements of new business environment. Whether at organisational, market or at administrative level, innovation leadership or leadership for innovation approach needs to be considered as first step of the innovation process for companies to stay ahead of competition. Innovations are a driven tool for entrepreneur that always expect the environment to find new business niche. According to Schumpeter (1934), the concept of entrepreneurship and innovations are complementary in a sense that an entrepreneur relies on the type of innovations depending on the level of change occurring at a particular period of time as depicted on the table 3.1 below.

Types of innovations depend on the inventions or transformation phase of an economic cycle. A boom on digital innovations assisted by smart technologies marks the fourth revolution phase actually occurring around the world. From traditional ways of doing things to digital approach, the change is drastic due to radical innovation that led to explosive growth despite increase on market competition.

Table 3.1: Types of innovation

Types of Innovation	Incremental	Breakthrough	Radical
Change	Medium	Substantial	Drastic
Profitability	Maintaining margins	Increase revenue and margins	Explosive revenue growth
Competitors	Easily imitable	Greater competitive advantage	Considerable competitive advantage

Source: Schumpeter (1934)

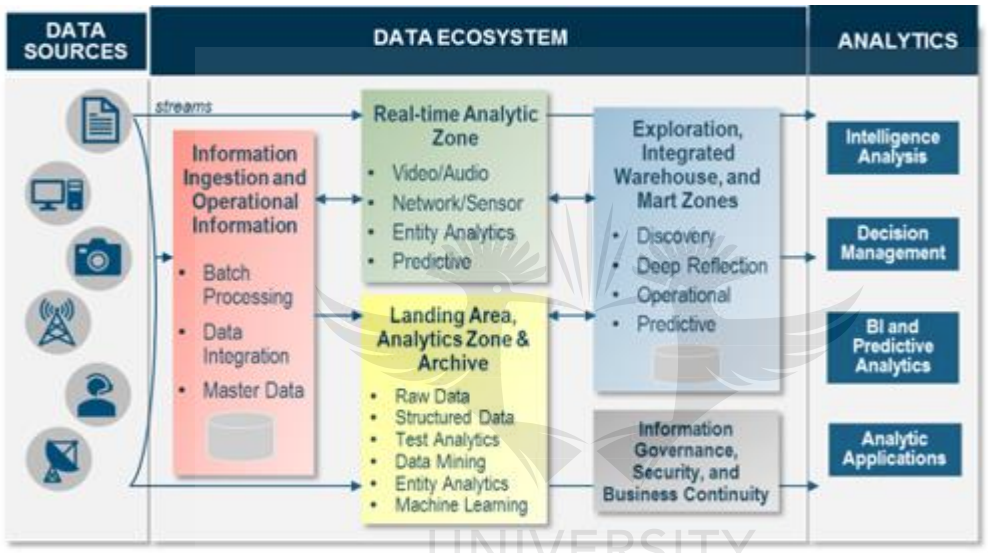
Innovation can be done on business processes, products, or services as well as on the management structure besides change on IT architecture and infrastructure through creativity thinking (Littunen, 2000). Everything new needs to develop adaptation skills to survive in the

environment. In so doing, Schumpeter (1947) argued that adaptive and innovative strategies should be developed in order to respond to the continuous change of market dynamics. Although innovative strategy is too risky due to the level of uncertainty, observations showed that the environment itself is too volatile as well limiting adaptive strategy. However, it is up to the company to define a suitable strategy based on the industry's evolution and the possibility of new entrants. In any case, companies that want to grow must reshape the business to follow innovative strategy especially in the current digital world and also because innovation remains the first step of the revenue growth that comprise innovation, digitation, customer impact and globalisation as highlighted by Pwcaccelerator (2018). In the field of IT solutions, enterprise resource planning software had developed innovative approach to upgrade solutions package and thus meet customer expectations. Compared to the old version of business management solution, current ERP application can offer portal personalisation, multi-legislation, scalability, mobility access and possibility to integrate with external solutions (Sage, 2018).

Technological innovations are driven by the Internet of Things that in its turn carry cyber-attacks. This entails that digital innovation should always be considered security measures associated to the process and systems. Digital revolution has globalised IT systems around the world enabling growth opportunities as well as risk exposure. KPMG (2018) believed that organisations should develop a business approach that can allow identification of security risks than using a technological approach. Combination of the two should be a better approach in a sense that system upgrade might not affect business process but the level of security measures. Cyberattack is one of the major challenges associated with the new wave of transformation that cause data breaches and hijacking. Contrary to what people can think, cyber-attacks are done by individuals as well as well-organised entities who continuously develop advanced persistent threats known as APTs (ITU, 2009). They found out that malware are the most malicious software and programs that easily infuse devices and systems to breach, destroy or exposed personal data information.

IT architecture covers process digitisation and automation altogether with digital security and digital compliance. Depending on specific systems, system architecture is made of multiple servers that allow to achieve system roles such as data execution, processing, web, printing, help reading and so on. Rklesolutions (2018) argued that a solid system architecture should hosted in the cloud for safety and efficiency while limiting infrastructure installation and maintenance. System architectures host the integration layer that manages communication between infrastructures, architecture as well as business transactions using service interface

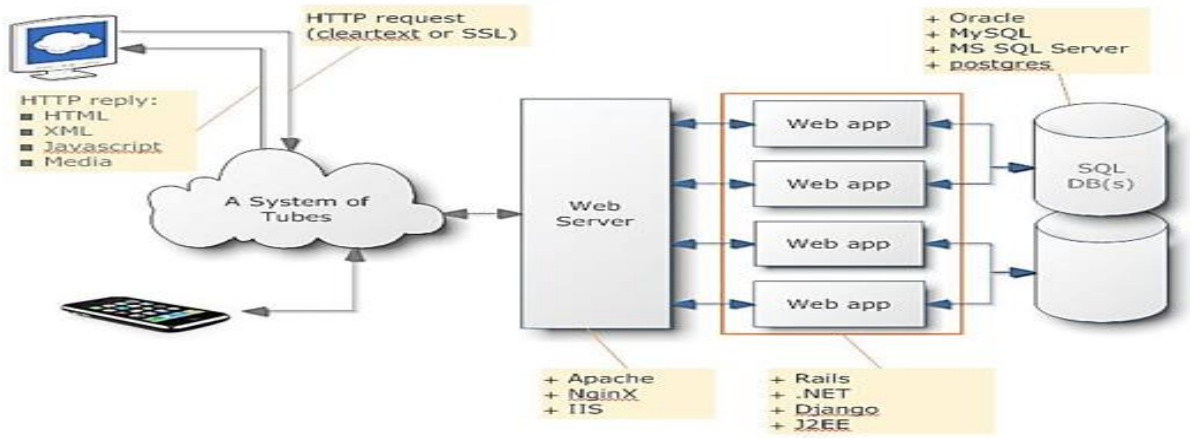
standards such as Http, IP address and URL. Integration layer comprises architecture layer that holds servers that supports applications, database, routers, and switches. Cloud technology approach uses platform as a service (Paas) as well as internet as a service (Iaas) as enablers of architectural deployment. Evidence show that cloud-computing is itself a form of storage security for business data. Systems can be directly connected through point-to-point integration or using a middle ware system as a bridge. Technological innovations comprise management of big data and analytics through appropriate sources like smart phones, internet banking, bank App, cameras and so on and a well-structured data architecture enabling analytics application, business intelligence, intelligence analysis and decision-making process.



Source: Analytics8.com (2020)

Figure 3.4: Conceptual Data architecture

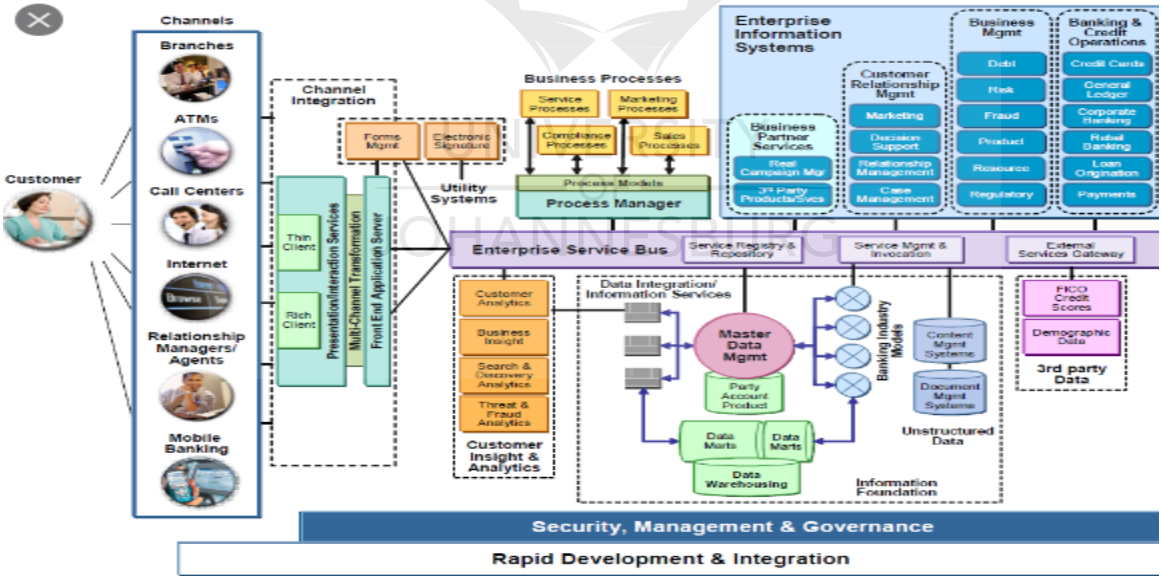
The overall system architecture includes cloud connectivity, databases, servers, computers, runtime, and all applications use in the organisation as depicted in figure 3.5 below. The target of data protection leads business to use cloud computing as safe place for data storage. A standard web application system architecture displays as follow:



Source: ResearchGate (2020)

Figure 3.5: Web application system architecture

In practical banking environment, system architecture is very complex as the example displayed on figure 3.6 below. Customers use all digital channels at a point in time that involve many business processes and enterprise information systems such as business partners services, customer relationship management, business management and lastly banking and credit operations.



Source: Dragon1.com (2020)

Figure 3.6: IBM banking reference architecture

In summary, digital technology innovation comprises factors that contribute to the increase of bank efficiency namely smart innovations, Internet of Things, smart devices, data Analytics, artificial Intelligence, emotional intelligence, and cyber securities.

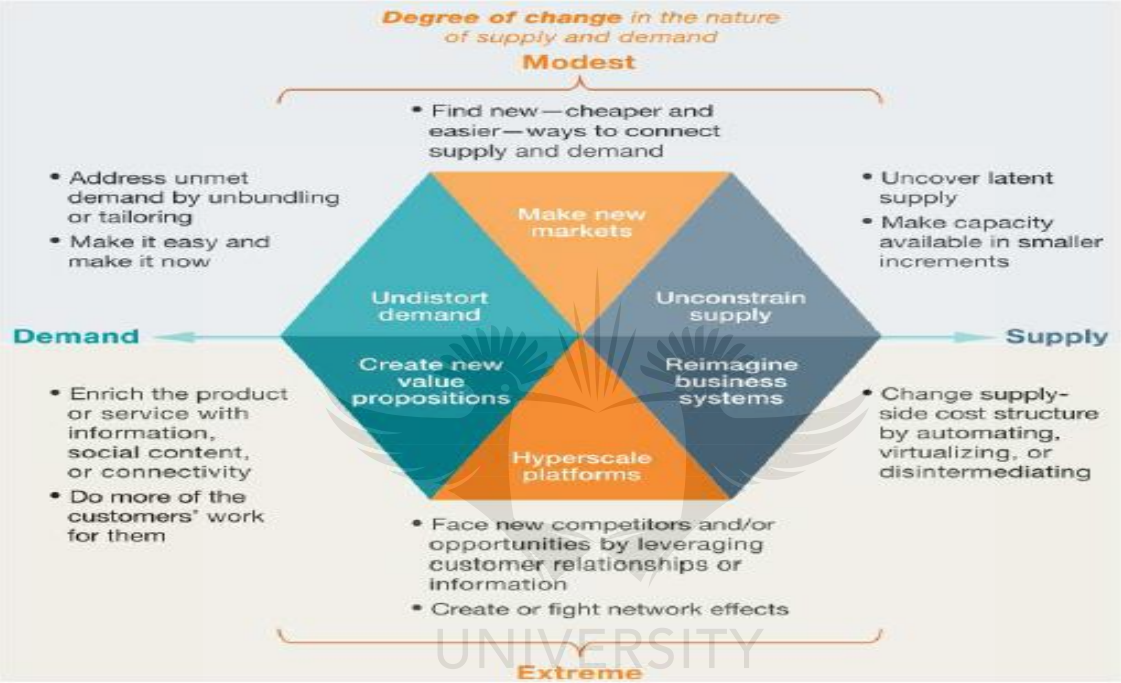
3.2.1.3 Digital Customer Experience

Customer experience is actually at a higher level than what bank should expect due to knowledge acquisition form competitors and social medias. This leads to more expectations from the customer that open doors to new entrants in the market. Above all, expensive regulations enforced by the reserve bank institutions cause bottlenecks to financial service growth (BearingPoint, 2018). In doing so, challenges are both internal and external to the banks. Technological changes leading to customer knowledge are forcing the banks to improve their banking approach through development of new digital services. Impact on business models has significantly transform financial services delivery. Additionally, change occurring in the banking sphere have opened doors to higher market competition breaking industry limits. It is therefore important for banks to continuously engage with customers to be ahead of digital needs. Any organisation should perceive digitalisation as a business booster as it enables competition, efficiency and growth. However, being digitalised does not absolutely mean solution to all business challenges. It is up to the organisation to be well-prepared to counterattack threats that come with modernisation. It is important to note that digitalisation does not only bring opportunities to businesses, but it also creates collateral damages like demanding customers that are unavoidable. Banks do not need to increase branches all over the country because customers are computer-wised and are using smartphones with bank application fully installed. This suggests that banking as well as other public payments can be done online without any interaction with people at the till. This further highlight diminution of bank offices and staff retrenchment with the increase of artificial intelligence. Negative impact on families' incomes and on the overall economy deserve some attention.

It is not easy to time impact or maturity of technological developments. From traditional to innovative creations, there is a huge gap that companies or creators themselves cannot predict. People do not take time to adapt to new products avoiding any risk related to unstable product. Since the introduction of bank applications, many bank customers are still not using the bank apps. FNB for example has stopped to give eBucks incentives to the customers not using FNB apps. This suggests that despite the use of smart and mobile phones, customer still need to be leaded to the digital world. Consequently, people are willing to use financial services from non-banks. In summary, digital customer experience includes variables such as digital channels and Social Medias.

3.2.2 Digital Business Process Reengineering

Digital business process reengineering (DBPR) involves digital change of the traditional business process management. It is advised for an organisation to be aware of the threats and opportunities that come with change in order to reshape the ongoing business processes. Saeed et al. (2020) stated the opportunities and threats that are associated with the digital disruption namely the new markets, new organisational core values, hyperscale platforms and reengineered business systems, among others.



Source: Saeed et al. (2020)

Figure 3.7: Framework to identify opportunities and threats from digital disruption

3.2.2.1 Digital Change Management

Authors such as Parviainen, Tihinen, Jukka and Teppola (2017) developed a digital transformation model derived from a synthesis of case studies to handle digital transformation. They argued that the model will help organisations to easily tackle change related to digital change following four main steps as follow:

- Positioning the company in the digitalisation sphere
- Analysing current company's state in alignment with the new digital goals
- Defining roadmap to reach new digital goals
- Implementing digital actions with technical support

In summary, digital change management includes adaptation to all changes associated with the digital disruption such as legal compliance, digital culture, employee development, adaptation and collaboration with intelligent machines among others.

Digital transformation has moved standard or traditional processes to reengineered business processes due to the Internet of Things. Reinventing your business model to create and deliver values. Business process management is a body of techniques, methods and systems platforms to define, optimise and monitor the business process of an organisation while reducing costs (Weske, 2012). Regarding the level of core business transformation evolving with the digital storm, it is important to know how to approach the digitalisation with business process management. Whatever the size of the company, evidence showed that enterprises are going digitalised without analysing implications on their strategies, organisational structures and their core operations. Imgrund et al. (2018) argued that organisations should use a functioning business process management as a foundation for digital change while following associated digital requirements. Reengineering of business process always involve use of information systems to improve agility and consistency of business process. Users' experience, preferences and expectations push companies of converge to mobile, cloud and smart technologies to streamline with big data applications, automation and integration (Sebastian, Ross, Beath, Mocker, Moloney & Fonstad (2017) and Dremel, Wulf, Herterich, Waizamann, & Brenner (2017). According to Legner, Eymann, Hess, Matt, Böhmann, Drews, Mädche, Urbach, and Ahlemann (2017), the process of digitalisation should follow steps such as empowerment, digital leadership, data-driven agility, stakeholders' commitment, digital platform, business model innovation and IT architecture transformation. Imgrund et al. (2018) argued that business process management has capabilities to address requirements of the digitalisation as displayed in the table 3.2 below:

Table 3.2: Digital requirements versus capabilities of BPM

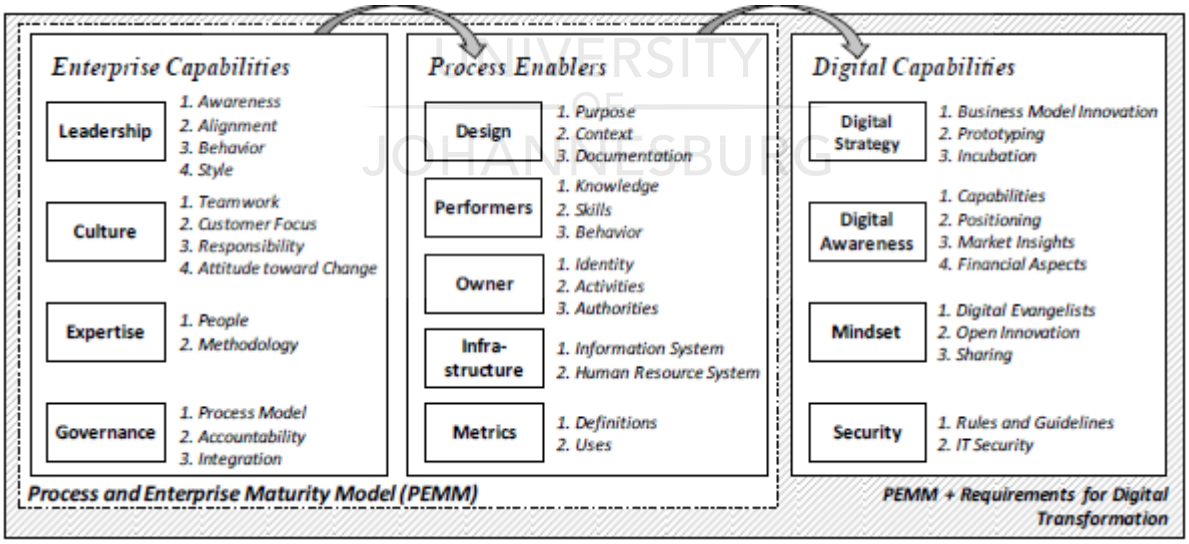
Digital requirements	**Capabilities of Business Process Management**
Expertise	cross-functional knowledge spill-overs facilitate collaboration and co-creation
Flexibility	process models enable knowledge management and information exchange
Involvement	improved coordination and communication increase agility and flexibility

Digital strategy	process-orientation connects all part of an organization
IT strategy	process models facilitate focusing on core-competencies and foster innovation. supports the awareness and acceptance towards change. uses IT for process automation, digitization, and data integration. aligns technological and business structures
Collaboration	uses production models to facilitate collaboration. facilitates modularization through process building blocks
Security	entails the formulation of rules and guidelines
Culture	creates a cross-functional culture and defines roles and

Source: Imgrund et al. (2018)

Based on the digital requirement and capabilities that include digital strategy, digital awareness, mindset and security, they developed a process and enterprise maturity model (PEMM) as displayed on the figure 30 below.

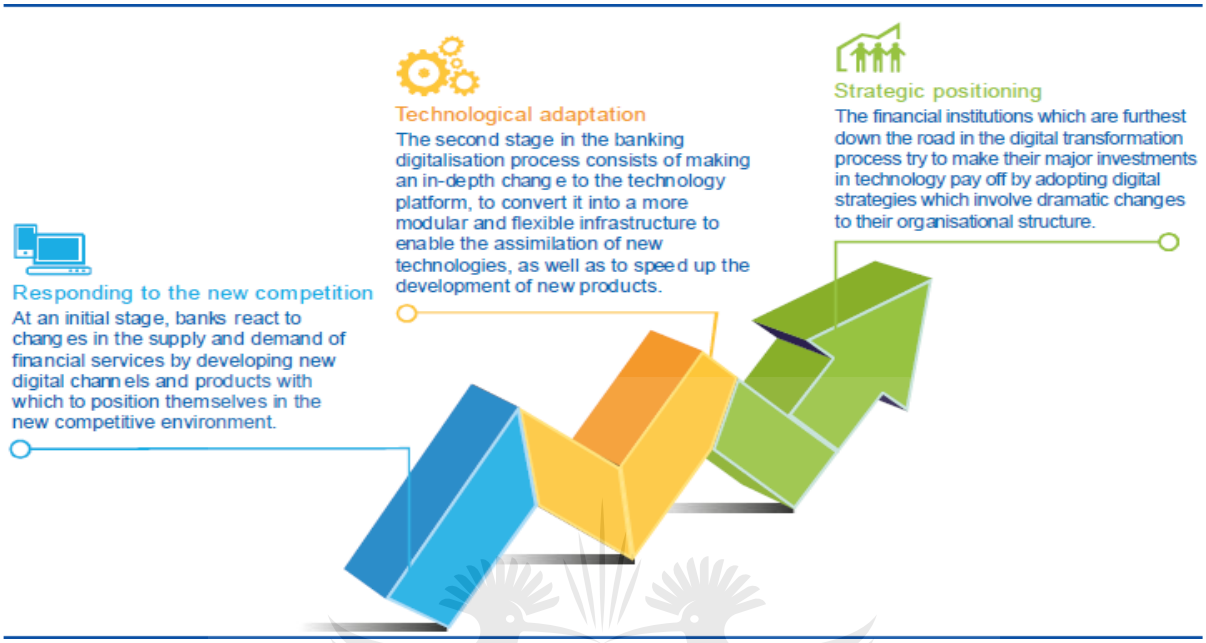
The journey of management transformation requires understanding of the enterprise capability, process enablers and digital capabilities in order to appropriately plan the overall change.



Source: Imgrund et al. (2018)

Figure 3.8: PEMM framework for digitalised organisations (PEMMDO)

According to Azard et al. (2016), digitalisation of banking process should follow three specific steps namely development of new channels and products, featuring of technological infrastructure and organisation alignment as indicated on the figure 3.9 below.



Source: BBVA Research/Azard et al. (2016)

Figure 3.9: Steps of banking digitalisation

3.4.2.2 Digital Business Process Reengineering

Digital revolution in banking industry is mostly about letting customer leading change, define innovative customer solution, reconfiguration of distribution channels, process digitisation and finally improvement on fundamental workforce (Kelly, 2014). Every country' agenda today is about getting digitalised to improve and provide efficient services at lower costs. But managing complexity of the digtalisation process constitute the bottlenecks. The use of radical diagrams as source code and the insufficient support for continuous change and process adaptation are the consequence issues (Dubois et al., 2011). These authors develop an application called dynamic condition response (DCR) technological graph to shed a light on digitalisation issues through simulation and testing agile of collaborative, bottom-up business digitalisation and workflow processes. Although the Mc Kinsey report published in 2017 showed that whatever the level of automation of business processes, less than half of the activities will be fully automatable, digitalisation knowledge and process agility will meet the change requirements. Solutions like DCR technological graph will be use upfront to test complexity of knowledge business processes in any organisations before implementation. Beyond work processes,

impact of digitalisation can affect the ecosystem or the industry as a whole. Internet banking is a digital process that came and disrupt traditional way of banking and thus change the whole banking ecosystem especially business models, platforms and consumer behaviour. A recent survey run by the global centre of digital business transformation revealed that 69% of respondents strongly agreed on the need of matching and adapt their business models to be aligned to the digital environment. It also informed that only 25% of enterprises have proper documented plans to tackle the disruption and manage the change. Ernst and Young (2015) argued that digital change should not only manage change internally in the company but also between outside stakeholders namely suppliers, customers, government and so forth.

Traditional Banking Processes

According to the current study, traditional banking processes symbolise process before the advent of the digitalisation. The objective is to highlight the degree of change associated with the fourth industrial revolution (4IR).

Reengineered Banking Processes

The current study considers as reengineered banking processes all standard banking processes that had been transformed by the digital age where the Internet of Things and Artificial Intelligence rule the business.

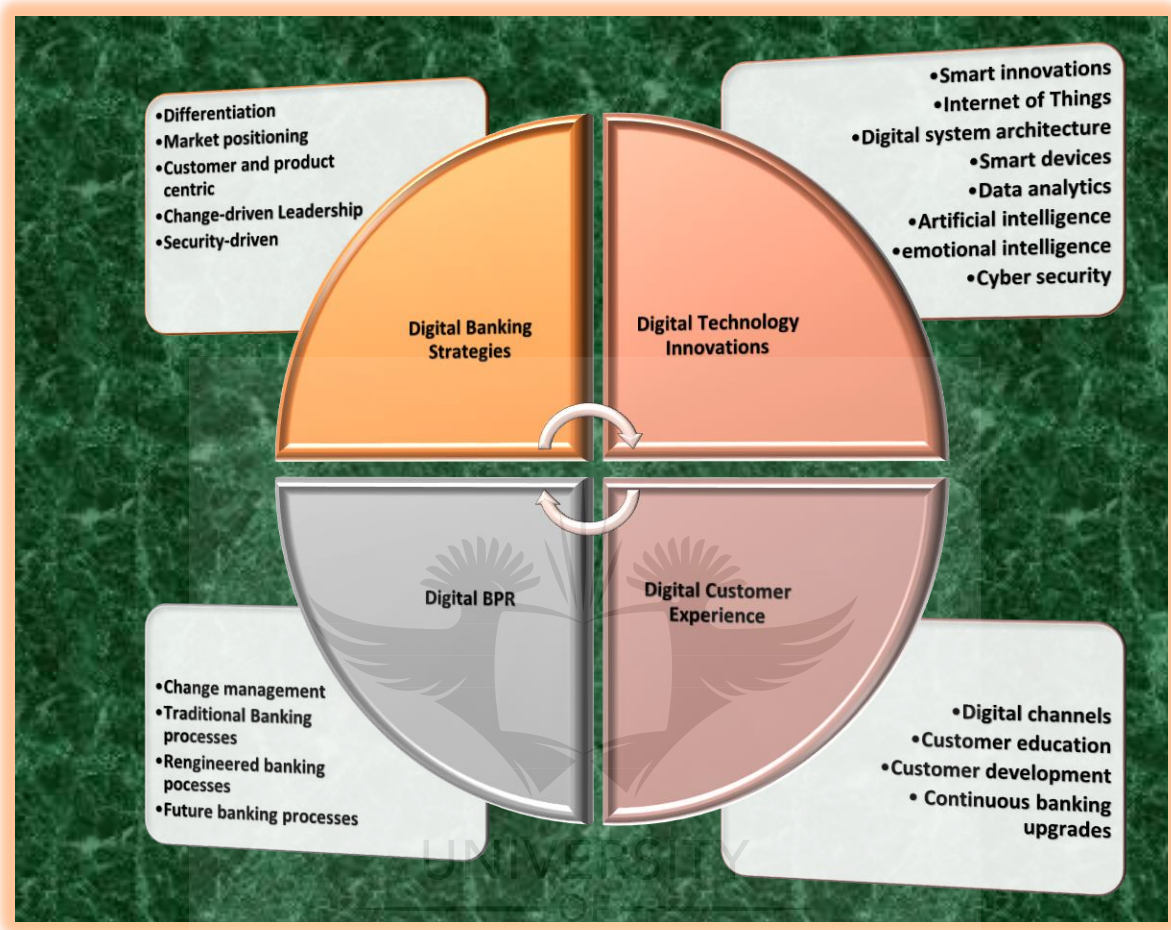
The gap between traditional and reengineered banking processes tells about the degree of digital automation. Considering the customer experience and its demanding behaviour, reengineering of existing banking processes cannot be static. Banks should be prepared for the continuous replacement of banking processes to meet customer's expectations.

Future Banking Processes

Considering the continuous change of the customer' behaviour, banks must be ahead of their expectations. Digital natives or millennial customers are too demanding since they are acquiring knowledge from the social medias, digital market, other banks' competitors and mostly from smart devices. South African banks must be predictable through consistent communication with the customers regarding their expectations in order to offer product and services with more functionalities than what the customers could expect.

The digital market on its own is responsible for change of customer' attitude because the amount of digital product/service offer is far above the customer perceptions. Digital companies want to be market leaders through provision of tools that suit up-to-date and even future demands. Company like Adidas currently offer a possibility for customers to design the

shoes of their dream for Adidas to make it for them. This example implies that future banking processes will definitely change because the customers will be participating in the product/service design process.



Source: Own Compilation

Figure 3.10: Digital Banking Performance Variables

3.2.3 Other Factors Influencing Digital Bank Performance

3.2.3.1 Digital Project Management

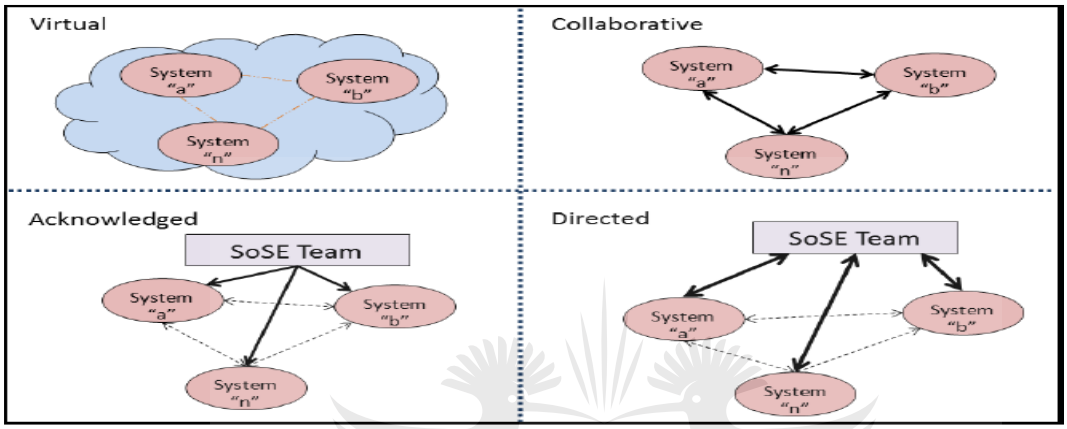
Successful implementation of digital transformation requires integration of project management. But evidence showed that 70% of new project implementation failures are mostly due to employee resistance to change and lack of management support (McKinsey (2018); Ewenstein et al. (2015)). Digital revolution is predominated by multiple implementation of IT architecture and infrastructure in the domain of information, communication and technology. Such upgrade on systems development is classified as project implementation as they follow project principles and process as defined by the Project Management Institute (PMI) and the

Project management Body of Knowledge (PMBOK). In comparison with PRINCE 2 that is suitable for small and medium projects, PMBOK project methodology is recommended for big IT projects such as fibre optic installation, database and system infrastructure. A project is measure based on the icon triangle element that contains cost, quality and time. Evaluation of digital project also considered timing, quality and cost as key performance indicators. Although human factor is not highlighted, it is important to mention that people constitute the critical element of project implementation. Successful results of the project implementation depend on people commitment. Compared to traditional project management that had a fix project implementation methodology, modern project requires flexible and agile due to dynamic nature of the current environment. Traditional phases of projects implementation are initiation, planning, monitoring and execution but companies tailored them according to the nature and the duration of the business the unexpected events as well as risk related to every phase. Capacity of following project governance guidelines for a specific project depends on the project manager skills. Silvius and Schipper (2014) argued that project manager should developed technical, behavioural and contextual competencies by improving individual cognitive through system thinking, anticipatory and normative. It is once again up to the project manager to build up a strong project team that will lead the project implementation. Consulting companies in the era of digital project follow specific project phase namely analysis, design, build, test and deployment (SAGE, 2018).

3.2.3.2 Digital System of Systems Reengineering

Resisting to the digital storm is about developing appropriate strategies especially in the area of ICT to remain strong and thus survive to the turbulences. As a strong business enabler, implementation of a sophisticated ICT platform improves any other aspect of the business following specific business process reengineered accordingly. There is a plethora of application available in this digital era full of IT transformation. It is important for business to go for open systems compared to closed systems that do not allow connectivity with other systems as pointed out by Chick (2004). Systems of systems belong to the category of open systems able to interact with other systems whether directly or through bridge system platform. Nowadays, technological revolution is based on the connection of things regarding the increase of the Internet of Things. For instance, remote connection between household appliances, automobiles, computers and so on. Rapid change of the global economic sphere goes along with complex management issues to be solved. Most of the times, standalone systems cannot be efficient hence the need to combine two or more systems together to achieve major tasks.

So, the so-called system of systems symbolises reunification of many system to create one big and powerful system to face environmental challenges. Maier (1998) argued that systems of systems reengineering refer to an integration between independents systems that operate efficiently and that are subcomponents of the full set. He argued that relationship between systems is based on the management type that can be virtual, collaborative, acknowledged or directed (Figure 3.11). On the two last ones, there is a central authority or team that management collaboration between subcomponents.



Source: Maier (1998)

Figure 3.11: Types of systems of systems

According to Schmidt (2006), data intensive and heterogeneity are other important characteristics to be considered while dealing with systems of systems. He pointed out that bringing systems together increase the volume of data to be vehicle among subcomponents. The concern about the heterogeneity is that at the origin, each subcomponent has been programmed using specific data type, system configuration and languages different from other subcomponents. How can the communication happen with such differences? Regarding the degree of IT transformation, observations has proven that integration layer between systems' components is conceived to manage and fix inter difference between systems in the domain. Regarding the fact that each system component is independently efficient, information exchange between systems should follow the principle of homeostasis by maintaining a state of equilibrium over time (Hannan & Freeman, 1977). Depending on the nature of subcomponents the naming can be different. If the subcomponents are made from systems like hardware and other devices, then it is systems of systems. But are the subcomponents systems and software then the appellation will be systems of software systems engineering. Linkage of systems can be done between businesses named business-to-business (B2B) or between

business and customers named business-to-customers (B2C). So far, few companies are getting direct integration with their business partners such as bank for payment, customer through customer relation management portal as well as with their manufacturers to include supply chain steps in the progress reports.

Meeting requirements of the new digital world rely on the degree of scalability of system whether sand alone or integrated package. This entails that redesign and upgrade of system capability is a necessary tool to develop a competitive edge. Reengineering of systems is an approach to meet customer expectations regarding the level of customer experience already acquired through social Medias. Independent systems might not be efficient enough to compete in the marketplace due to the rapid and radical change not manageable. Synergies between systems is a tool to meet efficiency and growth in a sense that standalone systems lead to manual reconciliation and a lot of paperwork that causes long business process and lack of business optimisation. While managing system of systems engineering, it is capital to understand and manage vulnerability and risk related to system's owner behaviour (Silito, 2010). He emphasised on the reductionism principle stipulating that engineering techniques should be put in place to clearly define boundaries and issues coming from specific sources inside the integrated system. This suggests that integration layers should host the control device as middle ware.

3.2.3.3 Digital System Integrations

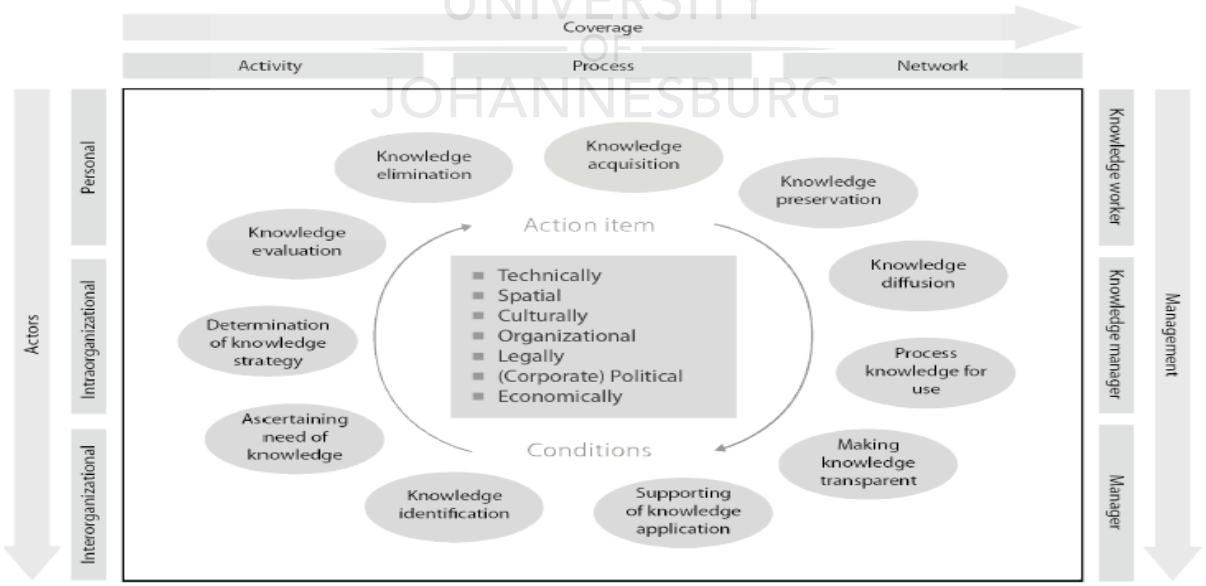
System integration is another form of digital transformation that companies choose for upgrade and competitive advantage through cost-cutting and delivery of quality service. Based on the level of interconnectivity between devises and systems, one of the future revelations will be about developing a unique and global system in the world. At this stage, the focus is at the strategy and profitability levels between corporates systems by means of business to business (B2B) systems and/or between business and customers (B2C) systems. More efficiently, system communication between corporate and bank systems remains the most effective one to easily boost economic growth. Such integration requires sophisticated and complex digital systems and infrastructure for electronic data management and processing to meet on time information access. Peng and Gala (2014) argued that system integration requires customised interface architecture using cloud-based platform and meta data management. Although banks are careful about risk exposure associated with systems integration, automation has become a must for organisations and for financial institutions in this era of digital storm. Digital transformation comes with a high level of customer experience forcing companies to mind the

behaviour of their customer. Companies have been using third parties for electronic banking platform to avoid straight connectivity and automation. Nowadays, some South African banks have chosen to partner with IT companies to provide internal solutions to corporates leading to the straight connectivity (PWC, 2018). Besides these challenges, system integrations facilitate business process flow and risk management through multilevel control and supervision.

4.2.3.4 Digital Knowledge-Based Management

Digital upgrade is all about emotional intelligence that evolves self-learning, and self-improvement to face the challenge of the change. Since people or staffs are the critical resources in executing automation of banking processes, resistance to change should be limited through knowledge improvement.

The correspondence between digitalisation and enterprise knowledge networking has been studied by Vladova, Ulrich, Bahrs and Bender (2018) who highlighted the improvement of knowledge management system as developed by organisation following enterprise social media effects. Knowledge management initiatives follow two approaches such as codification that focuses on explicit knowledge and the usage of technology and personalisation that implies implicit knowledge, people and culture (Tsui (2003) ; Hansen et al. (1999). According to Gromau (2009), knowledge management framework comprises eleven knowledge tasks as displayed on the figure 3.12 below.



Source: Gronau (2009)

Figure 3.12: Knowledge management framework

3.2.3.5 Digital Cyber Security

Cyber security can be defined as "The organization and collection of resources, processes, and structures used to protect cyberspace and cyberspace-enabled systems from occurrences that misalign de jure from de facto property rights" (Nadia and Randy, 2014). According to Atul, Suraj and Surbi (2013), “Cyber security is the activity of protecting information and information systems (networks, computers, data bases, data centres and applications) with appropriate procedural and technological security measures”. Issues like fraud, crimes, espionage, disruption and so on are at the origin of cyber insecurity in the cyber space. Malwares are malicious software such as viruses, worms, Trojan horses, botnets, logic bombs, rootkits, back-doors, adware and spyware that disable, damage, take control or steal information from any system (Miller, 2014). Traditional securities methods have failed to protect understanding cybersecurity landscape has become a global concern involving international laws and regulations. Cyber defence and system security are the digital measures that for part of the digital policies and compliance followed by organisations. This suggests that companies should include anti-attack strategies in the overall business goals. Additionally, companies need to reassess the level of security of the existing system infrastructure and architecture in order to fill existing gaps with advances security measures. Sometimes, advanced security measures go in hand with new and complete system installation that change the overall business process. In doing so, decision to upgrade system and data security should be taken at the top management level considering every angles of the business and the future market game. According to Abomhara and Geir (2015) environment and infrastructure need to be strongly protected against cyber-attacks that target both hardware by means of Internet of Things and software source by means of internet of service. Although sometimes organisations build solid barriers to internally protect themselves, observations showed that governments fail to define norms and security measures at the external or international level as argued by (Neutze & Nicholas, 2012). They pointed out that cybersecurity is not just an organisation issue but a global concern that should follow a global norm-development process designed by international policy and regulation makers as well as industry leaders. Public against private network. Any cybercrime has a specific target to reach. E.g., Spear phishing and Phishing target Infected Link or short URL, data storage, computer systems while Exploits and Spam target end-users e-mail and servers. Botnets target servers, files, computer programs, applications. Complexity of IT systems open bridge to intruders (Individual, organised group and intelligence agencies) to easily infiltrate private data. Fighting cyber-attacks requires major efforts and IT knowledge as part of the cybersecurity strategy besides governments mandates

(Nojeim, 2010). Firewalls allow to filter, and block in-and-out attacks. According to Atul, Suraj and Surbi (2013) one of the most important approach of counterattack cybercrimes is about people education about all aspect of the cyber space namely cyber infrastructure, cyber ethics, cyber safety and cyber security. This approach is really useful regarding the level of which people and companies are always connected on social Medias that are channels of internet attacks (Nikhita & Ugander ,2014).

3.2.4 Digital Disaster Management

Digital disaster management forms part of the constitution in South Africa. A state of digital disaster can occur when one digital issue affects the entire nation. This study includes digital disaster as a digital variable because the digital era comes with a dependence on the electricity, internet connection and data management. At any time, a lack of those elements will compromise the value of being digitalised for better work and life's conditions. So far, South Africa has experienced disaster such as extreme cold, hail, windstorm and tornado, explosion, structural and veld fires, human and animal epidemic, water contamination and flood as well as the hijack incidents (Economic and infrastructure losses…). Currently, the whole world and South Africa are facing a global disaster due to the pandemic of the Corona virus (COVID-19). Digital transformation links individual, communities and the whole country at risk since dependence is built up on sharing the network. Considering the level of cyber-attacks and data breaches, the government should put in place a contingency plan to identify, respond and recover the impact of IT disaster in the communities and in the country as a whole. The digital phenomenon comes with the interconnectivity between systems whether on premises or in the cloud. Besides natural catastrophes, the government is equally accountable for properties, people as well as data safety in the field of ICT. Hence the need for the government to define virtual limit that will protect internal systems from worldwide attacks. Technological revolution together with human threats come as a package and thus force organisations and institutions to put serious measures in place to counter the bad effects of digital improvement. However, disruptive technologies are used to control, and fix disaster caused by smart technologies such as drones, robots, artificial intelligence and so on. From computer hacking to data breaches through domain infiltration, business entities are exposed to digital disaster because of the negligence and/or the followings: Security vulnerabilities, unstructured passwords; poor configuration of the architecture domain; poor configuration of the network; poor configuration of web servers and the lack of endpoint restriction to end-users. Regarding the importance of digital needs in this 4IR, focus should be on how to plan, prevent and to be

prepared to solve any arisen disaster at any time following predefined techniques. System hijacking, breaches and loss of electronic data, loss of hardware and software can be sources of digital disaster from individual to the government level triggered by the nature or human-made.

As one of the subsidiary bodies of the United Nations (UN), the economic and social council for Asia and the Pacific established that disaster risk diminution is the key to ensure a sustainable development in the geographical space. They pointed out that geospatial as well as digital innovations allow to address disaster resilience in the region (UN, 2019). Although countries over the world can equip themselves with robust disaster management systems, an alignment to updated digital technology innovations can improve risk knowledge and disaster assessment following preventive approach compared to curative approach. In addition to risk awareness management define at the corporate or government level, people on the ground need proper training and preparedness as basic tools to be able to identify early signs of potential disaster to come.

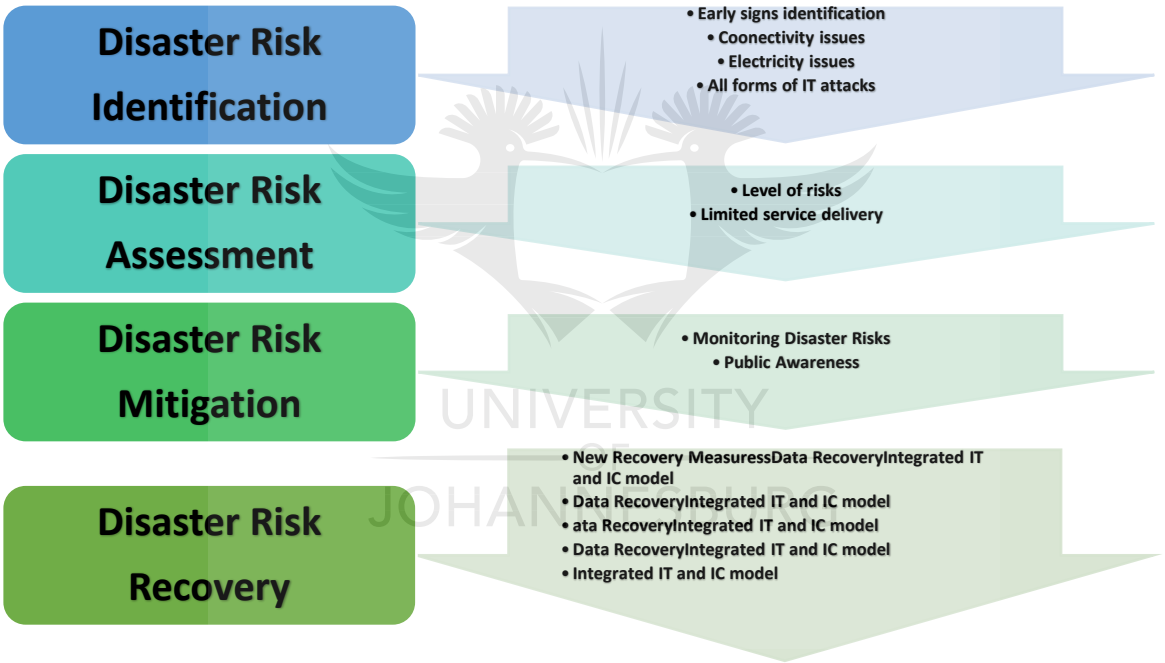
In summary, government authorities are responsible of assuring that combination of emerging technologies are harmless to the population as well as government functions across the country. In fact, the use of internet, cloud computing, data analytics and applications is all about big data management that needs to be stored and well protected. Many scholars wrote about disaster management in digital libraries in both developing and developed countries. With the digitalisation, everything is becoming digital and related to the ICT. In the IT field, disaster management mostly stands on data security or protection against breaches and attacks also known as cybersecurity. The research done by Hansen and Nissenbaum (2009) revealed that the three forms of securitisation namely technifications, every day security practices and hyper securitisation should be considered at individual and at network security level while solving IT disaster issues.

3.2.4.1 Digital Disaster Management in South African banks

Several disasters can happen on the South African banks namely loss of hardware, loss of software, loss of architecture domain, power outage/Server shutdown, lack of system maintenance and cyber-attacks leading to the data breaches through hijacking, phishing. Digital disaster phases can be summarised in many phases such as digital planning, prevention, preparedness as well as digital recovery.

Digital Planning

Commercial banks in South Africa have been part of the first institutions to embrace the digital change brought by the 4IR. Considering the role that banks played in boosting the economic sector, the country cannot afford any digital disaster affecting productivity and performance of banks. As part of the standards norms in business, alarm systems are installed to alert in case of damages that can harm both the staff and the infrastructure. E.g., Use stairs in case of fire and not the lift. Bank systems are opened to the public since every customer has his portal page to access the bank system and make transactions. In doing so, bank should restrict endpoint rights between internal and external users. Planning is not only about measuring material replacement and people to be in charge but also about defining financial budget to be able to respond to the attack in a timely and efficient way.



Source: Authour's compilation

Figure 3.13: Digital planning process flow

Digital Prevention

South African banks have learned from data breaches and hijacking happening in other corporates in South Africa and worldwide such as Liberty life and Adidas attacks. Therefore, preventive measures have been defined to limit and even block any strange information from entering the bank systems. The truth is that hijacking also work in the darkness to improve their maleficent tools to attack systems with or without benefits. Since millennials learn more from

the social medias without following best practices of IT knowledge, risk perception should be part of curriculum from basic to higher education. In order to prevent IT disaster, the African datacentres (2019) advised that datacentres must contain adequate power supply, backup generators, an effective cooling system, a climate control system, fire detection and suppression appliance as well as access control and security barriers. As part of the prevention plan, South African banks should create a centre for disaster management where a specific team is dedicated to analysing and founding prevention measures against digital tragedy.

Digital Preparedness

Digital preparation comprises creation of multiple data location on premises, in the cloud or use the hybrid form and make sure that staff can trigger backup data regularly. In the IT field, daily readiness involves infrastructures, software update and license maintenances. Data migration and backup routines in the relevant server whether on cloud are not the critical keys to focus on while assessing digital disaster. Banks should develop preparedness actions all related to the core business or the services that they offer. This suggests that attacks consequences do not have same impact on all products offered. For instance, home loan service cannot be attacked as online banking. Relevant department should always ensure that funds are available for immediate respond to a digital disaster while saving people first. Known as the most important digital asset, data is to be protected and saved. Organisations spent a lot of money to buy hardware and software and can only see return on investment after many years. Hence the necessity to avoid or mitigate any potential disaster that can compromise the use of the digital assets. IT disaster risks can be at individual, corporate or bank as well as at the governmental level depending on how severe the impact is**.** Risk levels can be low, medium or high depending on the gravity of the disaster and will equivalently require actions at individual, institutional or governmental intervention to efficiently mitigate the disaster. Observations showed that IT related issues are due to a lack of communication between users assuming the fact that communication is limited during any IT disaster in addition to system failures,

Digital Data recovery

Despite the efficiency of the disaster planning, prevention and preparedness, disaster might still happen because they are not controllable and can occur in different forms, shapes and sizes. Hence the emphasis on data repossession. Data recovery leads to the implementation of sophisticated systems or to the update of existing security systems. Data recovery depends on the backup storage previously installed in case of any loss. Hence the introduction of both cloud

computing and on-premises storage. Additionally, financial institutions have a list of stakeholders offering disaster recovery as well as insurance services. Most of the bank products are associated to insurance coverage in case of issues. In some organisations, IT professionals and experts are hired to retrieve data from the servers in the data centre, computers or any other IT devices without damaging them. The recovery techniques need to distinguish whether the device is contracted or owned by the company if it must be replaced or fixed. Tragedy recovery actions should be handled both the government and the organisation depending on the size, shape and the gravity of the impact. For instance, by creating a centre for recovery platform at national and international level, the government assures successful repossession of data loss. Figure 36 depicts digital recovery process flow in case of disaster rehabilitation and recovery.

Source: Author's compilation

Figure 3.14: Digital recovery process flow at the bank

3.2.5 Digital Disaster discrepancies

Somehow, digital differences between regions and local communities question disaster preparedness and capacity of people and organisations in those areas. Such weaknesses constitute an opened door to cyber-attacks because of the lower level of technological innovation understanding and use. For instance, a tick on one option in the smartphone can be the channel of data losses and hijacking through Internet of Things. Vandalism and destruction are part of the source of disaster occurring in South Africa because of political and social instability. Recently, the xenophobia attacks where at the origin of vandalism at the universities and shops in some areas in the country. This entails that limitation of disaster caused by human being will be the result of government intervention in solving general instability in the country. Additionally, demographic and geographical factors such has age, sex, education and some local regions equally influence risk perception and disaster readiness in South Africa. In South

Africa, financial institutions such as commercial banks have adopted digital disaster preparedness through the followings:

- Definition of policies and internal rules to limit risk propagation among banks
- Designing of applications to identify risk of data vulnerability
- Providing guidance on digital risk management
- Incessant cover of risk in between banks
- Sharing risk experiences among banks
- Definition of digital risk regulations and related committees by the government
- Partnership between banks and internet providers

As mentioned earlier in the text, calamities should be handled by both the organisations and governments at national, regional and international ecosystem. At a government level, disaster-related ministries in addition to the IT and digital disaster department should work as a team to avoid any calamity that can affect the governmental management. Followings are the institutions managing digital disaster in South Africa:

- South African Constitution and the Disaster Management Act
- National Disaster Management Policy Framework Act
- National Disaster Management Centre, Provincial and District or metropolitan disaster risk management centre
- Private disaster risk management consultancy as private sector

Besides the internal entities dealing with tragedy, government leaders have the responsibility to create not only national disaster platform and centres but also to belong to regional as well as international disaster platform. Organisations and financial institutions must limit disaster management at the IT and digital disaster department or through related centres.

3.2.6 Banking digital disaster

Enabling technologies are equally useful to limit and to stop the impact of digital catastrophe on people as well as business as explained in table 3.3 below.

Table 3.3: Smart technologies and digital disaster control

Smart technologies	Disaster risk role
Internet of things	Allow worldwide connectivity, online banking transactions and data analysis
Big data	Immediate collection of voluminous data; Analytics record and analysis
Mobile phones	Easy communication, internet access, online banking access and pictures collection
Robots	Early detection of disaster signs, early prediction of disaster signs and microprocessors and sensitive sensors for detection
Artificial intelligence	Programmed to solve specific disaster issues, fast data collection and voice and face recognition
Social media	Help to collect donations Real time and High-speed information and communication
Drones	Remote area access; Fire and flood attendance
Cloud computing	Secured data storage
Fintech	Regulate financial market
Samsung pay	On-time payment in case of emergencies

Source: Own compilation

In order to successfully achieve digital disaster mitigation and recovery, South African banks need to apply the followings:

- Develop e-government initiatives
- Use digital management systems with access restriction
- Install hyper securitisation form using both cloud computing and data centre
- Define long-term storage structure
- Be ahead of technological change to upgrade system on time
- Install and maintain up-to-date anti-virus software in both hardware and software
- Develop security patches with continuous upgrading all aligned to the operating used (Microsoft, Linux, Oracle and so on)

- Ensure data migration in case of license or domain upgrading

3.2.6. Disaster management challenges

Disaster management and monitoring faced the following challenges limiting result' optimisation and long-term sustainability:

- Dependence on bank regulations by the SARB
- Bank' regulations and policies not always up-to-date in addition to
- Lack of norms and code of conduct ruling disaster management
- Few internet providers with slow connectivity
- Lack of digital disaster management skills
- Lack of human resource capacity and knowledge
- Lack of training on how to manage digital disaster causing unreadiness
- Excessive maintenance costs
- Limited partnerships and collaboration between countries in the region

In summary, performance of South African banks is indirectly affected by other factors such as digital Project Management, SOS Reengineering, Bank System Integration, Knowledge-based Management, Cyber Attacks as well as the Sustainable Development, the digital Economic Development and the Digital Disaster Management.

3.2.7 Digital Bank Performance

Bank performance can be measured by both non-financial and financial indicators. Financial performance indicators include financial ratios namely return on equity (ROE), return on assets (ROA), Credit Loss Ratio (CL) (Barua et al., 2019). Non-financial performance indicators include strategic, social, environmental, risk and sustainability performance as collected from the various websites of South African banks.

Strategic performance: It shows how efficient is the chosen banking strategies in meeting banks' objectives.

Social performance: It covers performance of banks in improving social inclusion and community development.

Environmental performance: This performance type tells about environmental commitment engaged by the banks through renewable energies, less CO2 discharges and green building compliance.

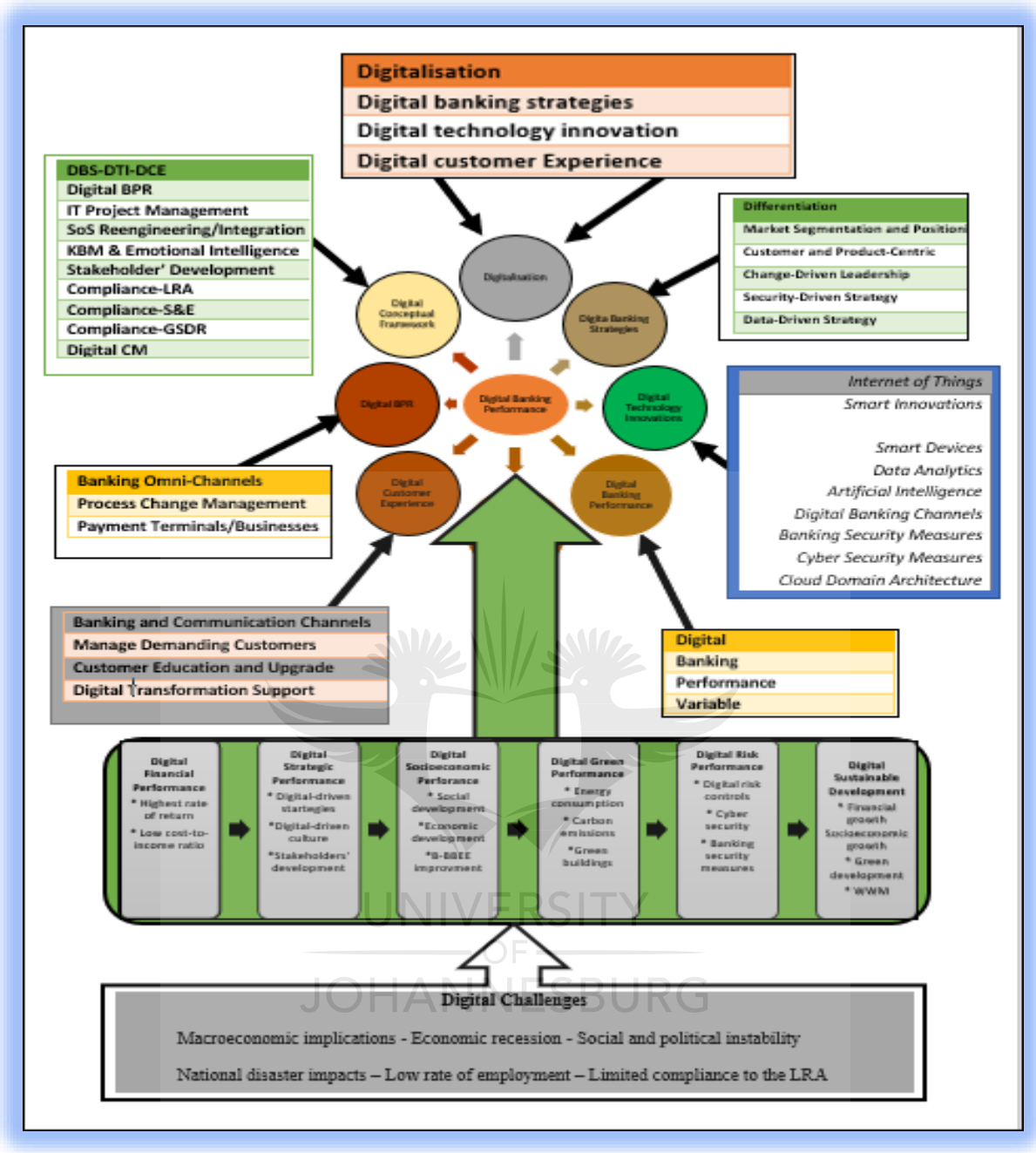
Risk performance: This type of performance highlights the capacity of banks in managing financial risk while improving productivity and customer satisfaction.

Sustainability Performance: This performance includes the aptitude of bank in contributing to future generations well-being through sustainable practices.

In summary, digital bank performance include the following variables: Financial performance; Strategic performance; Social performance; Environmental performance; Risk performance; Sustainability performance.

3.3 The proposed Conceptual Framework

Based on the above-mentioned elements, the digital conceptual framework has been depicted as displayed on figure 36 below. Compared to the literature review where only digital performance variables are elaborated, the conceptual framework includes additional factors that affect performance increase of South African banks. Considering the bank as an entire system, many factors relate together to form a solid financial entity. In doing so, digital project management, SoS reengineering, bank system integrations, knowledge-based management, cyber security and especially the digital disaster management. Consideration of the national disaster as a factor that an impact the performance, this study becomes particular because a national disaster occurred when this research was conducted. Detailed comments will be part of the findings based on the secondary data since banks have been publishing the impact on their productivity.



Source: Own Compilation

Figure 3.15: Conceptual Framework

3.4 Conclusion

This chapter reveals that the theoretical framework has been applied on the ground leading to the conception of an operational digital banking model. South African banks applied banking strategies, innovations, and have standard banking processes that evolve over time. Conceptual design established that project management, system of systems reengineering, bank system

integrations, knowledge-based management, cyber security and especially the disaster management are other factors that impact the implementation of a digital banking. The process of digital banking performance is exposed to digital banking disaster (loss of bank Apps, scarcity of digital skills, loss of power and internet) and digital challenges such as the macroeconomic implications, economic recession, social and political instability as well as the limited compliance to the LRA. This chapter ends with a proposed conceptual framework that can constitute a suitable guideline through the trajectory towards digital upgrade.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 Introduction

The research methodology chapter focuses on the research design and techniques used for the current research study. This type of research uses both a qualitative and quantitative research for better results findings in line with the research topic. Yin (2003) added that the combination of the qualitative and quantitative research enhances and add value to the research findings. In addition to this, the current chapter provides details of the methodology used as well as the approach applied to collect secondary data. Qualitative research is completed through use of surveys by means of questions and answers from the participants. Qualitative research is using descriptive approach for re-engineering by means of re-modelling digital business processes. The Likert scale questionnaire is used in a quantitative research.

This research uses secondary data sources to complete data collection and analysis to measure and evaluate South African bank performance. With regards to the literature review and the conceptual framework, the selection of performance variables considers the optimisation approach. The current study uses data and information collected by the banks and published to the public and is further corroborate with the surveys through questionnaires (Salkind, 2007). Additional information came from various technical reports and documentation made available by the banks. Lastly, this chapter emphasises on academic requirements that lead to effective research conduct. Ethical considerations and the limitations related to the research topic as well as to the challenges faced throughout the research run.

4.2 Research Design Justification

Since this study involves both primary and secondary data, both the qualitative and the quantitative design is used to meet research objectives.

The research topic and the literature review guided selection of research variables. In addition to this, conceptual framework revealed additional critical factors to be considered. The nature of variables allowed to determine the research methodology to be used for efficient data collection.

Currently in South Africa, several private and public organisations run research on social, economic, environmental and financial sectors among others in order to highlight areas of correction and improvements. From academicians to research companies, many studies used different models and approaches to reach the research target. This research uses quantitative approach to collect bank performance variables as they are audited and published to various reliable sources such as the banks and the South African Reserve Bank (SARB)' websites.

4.2.1 Qualitative Design

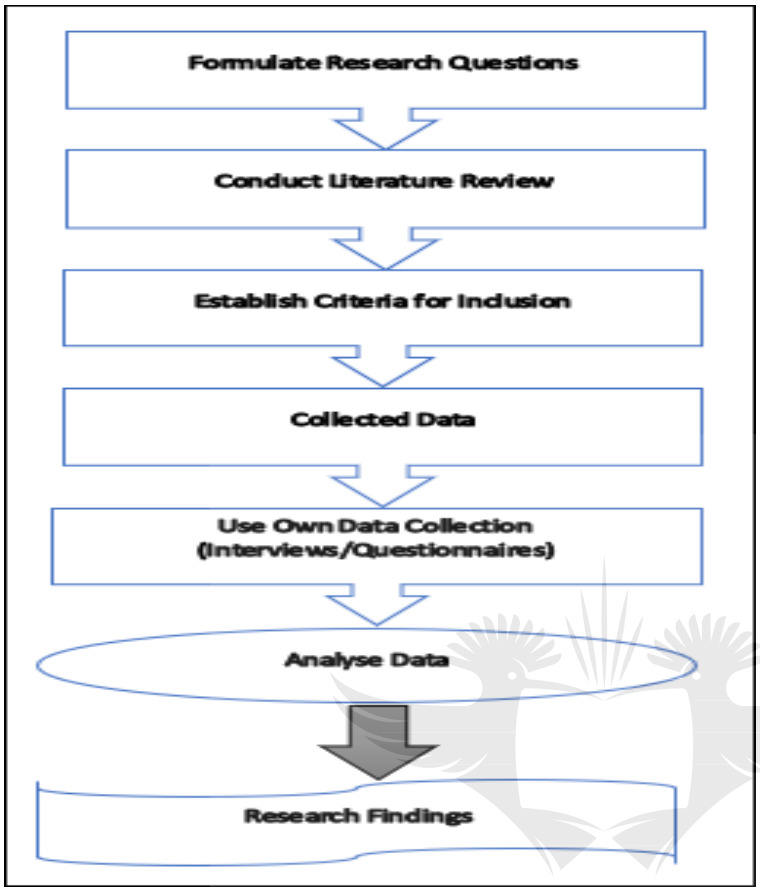
Salkind (2012) encouraged the use of qualitative design in optimising research findings because it helps to reshape the questionnaire or statement to ease the understanding by the respondents.

Considering the low level of education in South Africa, it could not be advisable to limit data collection from secondary sources. Research questionnaire approach is much better in a sense that statements are already made and respondents can just click for a yes or a no. The current study also chose to collect relevant data about digital disruption and the impact on banking performance through interviews that allow face to face interaction and verbal discussion with respondents (Questions and answers). Additionally, the process of sending questionnaire to organisations takes too long and is not finally authorised. People are naturally lazy to take 5mn to respond to a survey. Hence the need to approach them.

Just like the previous revolution era, the fourth industrial revolution is getting implemented in every sector to address and limit life and business challenges. Effective digital transformation benefits to everyone including people, households, businesses as well as financial institutions. People who operate in all these spheres of the economy are the end users on the street. Since efficient digital development is to be benefited by anyone, people on the street are relevant to be questioned about the importance of the digitalisation.

Luckily, most of the companies publish their annual reports and financial statements that contains qualitative information such as the reshape of banking processes that is required in this research. Financial institutions and other organisations were used to specific traditional business processes that were used for years and has become part of the legacy systems. The 4IR disruption has now modified existing business processes as well as the structure of financial business. Both the digitalisation and the environmental transformation have forced banks to define flexible business processes that can fit in any volatile environment. Waterfall business techniques are now replaced by agile business tactics to ensure long-term survival.

Business process evaluation falls under qualitative research design since processes are not quantifiable as displayed on figure 4.1 below.



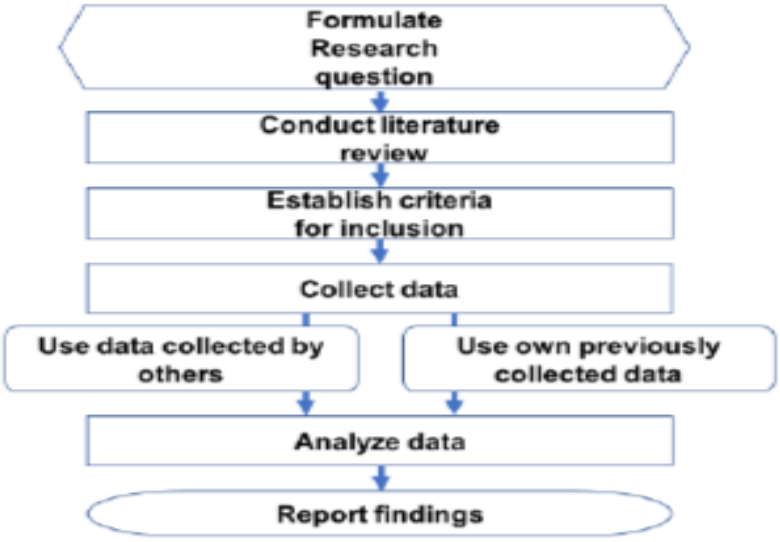
Source: Salkind (2007)

Figure 4.1: Process of quantitative data

In the case of this study, the qualitative research helps to hear from the end customers about the digital change at business and personal life through interview and/or questionnaires. Direct contact with the end users allows to collect both the data and their true feelings compared to ticking a dialog box. Additionally, interview allows to rephrase the questions and make it easily understandable for the respondents.

4.2.2 Quantitative data Research

Quantitative data research focuses on data collected from secondary source such as the banks' website, SARB' websites and other banks' websites that manage separate business spectrum.



Source: Salkind (2007)

Figure 4.2: Process of quantitative data

In this research about the impact of digitalisation on banking performance in South Africa, business performance is measured by financial ratios that are quantitative data disclosed by the banks themselves. Although the financial indicators do not use the same detailed variables from one company to another, financial ratios are financial aggregates that speak about the financial health of any business as published in previous research. Besides financial performance, South African banks also disclose their role in the socio-economic and environmental sphere. All compliance towards South African regulations, laws and Acts are published data that serves for quantitative research.

The quantitative research allows to use data collected by the researchers themselves or by other parties. In South Africa for instance, the statistics of South Africa institute constantly publishes data about all economic industries in their website for public use. The research can cross analyse data from different websites whether national or global to confirm the originality of the information. For example, the rate of unemployment in South Africa can be found in the Statistics for SA website and in the OECD and on the world bank websites.

4.2.2.1 Selection of Quantitative Data

As corroborated by Froelicher (2009), identification of secondary dataset is very critical, and it starts with an investigation to select relevant data that is aligned to the literature review and to the objective of the research. In the South African context, there is no standard methodology of financial and annual reports from one bank to another. The researcher must identify principal

source of disclosed information. Additionally, relevant financial data from both annual and financial statements are the one audited internally and externally before disclosure. Internal audit is done by the company while external audit is done by authorised and registered audit organisations. At the end of the fiscal year usually 31st December of each year, banks produce annual financial statements that are internally audited by the Group Audit and Compliance Committee (GACC) and externally by any chosen accounting firm to make sure that compliance functions, rules and regulations are applied as per the South African legislation. South African financial statements are prepared and published to the different bank 'websites in accordance with the provisions of legislation and compliances to which the bank registered. Financial statements should be aligned to the following acts and accounting requirements:

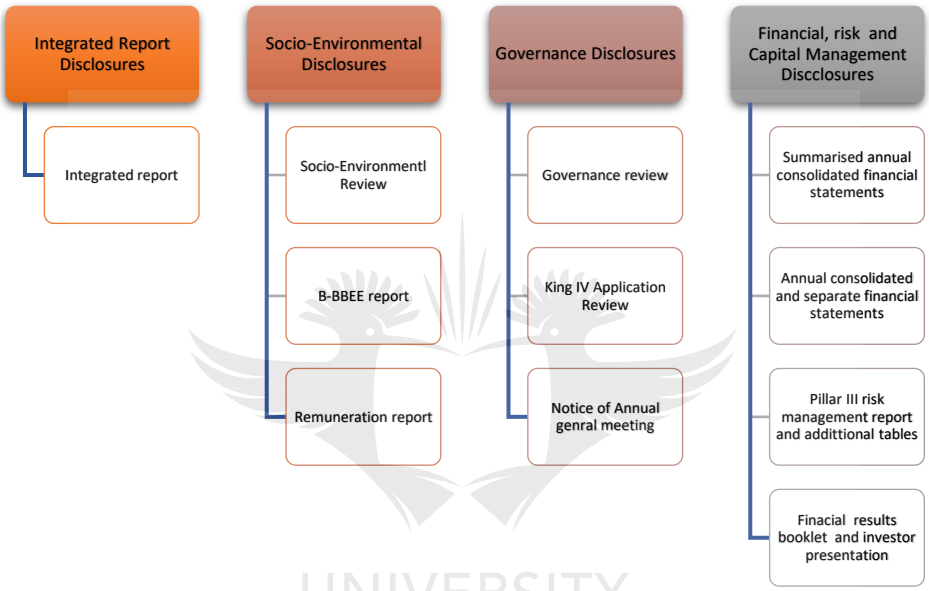
- Bank and company Acts
- Johannesburg Stock Exchange (JSE) listings requirements
- South African Institute of Chartered Accountants (SAICA) financial reporting guides
- International Financial Reporting Standards (IFRS)

The annual financial statements are approved by the Board of Directors and signed on their behalf by the group chairman and the Financial Director before reporting to the shareholders and the company. A consolidated financial statement is made for the bank 'group while a separate and standalone financial statement is done for the bank company itself. Both financial and non-financial reporting is by the banks in accordance with the reporting standards and frameworks as follow:

- Integrated reporting (IR) framework
- International financial reporting standards (IFRS)
- King IV report on corporate governance for South Africa (King IV)
- The amended B-BEE financial sector code
- The GRI G4 standards, financial sector supplement and the greenhouse gas protocol
- South African banks Act No 94 of 1990
- Basel III and other regulations
- The Previously Carbon Disclosure Project (CDP)
- The United Nations Sustainable Development Goals
- South African Company Act, No 71 of 2008
- IR framework of the international integrated reporting council
- Sustainalytics

- Equator principles
- Global reporting initiatives

Additionally, the reporting suite should include the integrated report, socio-environmental and governance disclosures in addition to financial, risk and capital management disclosures. The quality of the secondary data of the previous year is verified through the following year since financial information always displays a minimum of two years in all reports published at the end of the year. In summary, selection of secondary required a comprehensive review of all published reports in the research time frame.



Source : Absa (2018)

Figure 4.3: Absa Reporting Suite

4.2.2.2 Limitations on Quantitative Data Selection

Financial statements and various annual reports do not always have the status of audited or not audited compromising the originality of the published information. Additionally, audited version of annual reports is sometimes published the following year. This means that researchers have to wait at least 2 years to have accurate banks 'information. The current research covers a period of ten years from year 2010 to 2019. But unfortunately, annual reports of year 2019 are not yet fully published for the four big banks in South Africa.

4.3 Population and sampling

A research population is a set of people, manual and digital documentation that have a contribution to the research study as highlighted by Dremel et al. (2017). The current study has four main pillars that govern the structure of the research namely the digitalisation, business

process reengineering, digital banking framework and banking performance. Population and sampling are defined according to those pillars in the South African context. Following population and sampling steps designed by Shajahan (2010), population, sample frame, sample unit, sampling methods and sample size should be clearly defined. Table 4.1 below displays details of the current research population and sampling.

Table 4.1: Population and sampling

Research Pillars	Population	Sampling	Targeted sampling
Digitalisation	SA population, businesses and Banks	Four big banks, Provinces and cities Metropolitan	10 Provinces and cities Metropolitan/480 people
Business Process Reengineering	SA population, businesses and Banks	Four big banks, Provinces and cities Metropolitan	10 Provinces and cities Metropolitan/480 people
Digital Banking Framework	SA population, businesses and Banks	Four big banks, Provinces and cities Metropolitan	10 Provinces and cities Metropolitan/480 people
Banking performance	SA population, businesses and Banks	Four big banks, Provinces and cities Metropolitan	10 Provinces and cities Metropolitan/480 people

Source: Author's Compilation

Digitalisation

The population is represented by all economic sectors and people living in South Africa including those who are passing by. The digitalisation phenomenon impacts individuals, business and systems whether in a positive or negative way. The population represents all banks in South Africa that are local or foreign and registered at Johannesburg Stock Exchange (JSE) as well as all people living in South Africa.

The sample of the present study comprises the four largest commercial banks in South Africa that comply with South African reserve bank (SARB) policies and regulations. The selected

banks namely Absa, FirstRand, Nedbank and Standard Bank are all registered at Johannesburg Stock Exchange (JSE). The chosen sample is accurate and appropriate as it represents over 86% of the South African banks' population (SARB, 2018). The sampling customer will be both businesses and individuals that have bank accounts in the four biggest South African banks. Furthermore, digital interaction between the big four banks guides completion of fully digital financial institutions.

Business Process Reengineering

Once again, the overall population of South Africa constitutes the research population regarding reengineering of business processes due to the digital change. The government puts in place strategies to supervise the introduction and adoption of the digital processes in improving local economy. This entails that successful execution of the reengineering of business processes depends on people and businesses. Hence, the population represents all banks in South Africa that are local or foreign and registered at Johannesburg Stock Exchange (JSE) as well as all people living in South Africa.

The sample of the present study comprises the four largest commercial banks in South Africa that comply with South African reserve bank (SARB) policies and regulations. The selected banks namely Absa, FirstRand, Nedbank and Standard Bank are all registered at Johannesburg Stock Exchange (JSE). The chosen sample is accurate and appropriate as it represents over 86% of the South African banks' population (SARB, 2018). The sampling customer will be both businesses and individuals that have bank account in the four biggest South African banks.

Digital Banking Framework

Based on the customer knowledge about business framework used at the private or public companies and organisations, participants will be questioned about the importance of having a business framework and guidelines of future implementation.

The population represents all banks in South Africa that are local or foreign and registered at Johannesburg Stock Exchange (JSE) as well as all people living in South Africa.

The sample of the present study comprises the four largest commercial banks in South Africa that comply with South African reserve bank (SARB) policies and regulations. The selected banks namely Absa, FirstRand, Nedbank and Standard Bank are all registered at Johannesburg Stock Exchange (JSE). The chosen sample is accurate and appropriate as it represents over 86% of the South African banks' population (SARB, 2018). The four banks have subsidiaries

in each province and city metropolitan in South Africa. The sampling customer will be both businesses and individuals that have bank accounts in the four biggest South African banks. The total targeted sampling can be estimated to ten (10) provinces, ten (10) cities metropolitan and about 480 people in South Africa.

Banking performance

The population represents all banks in South Africa that are local or foreign and registered at Johannesburg Stock Exchange (JSE) as well as all people living in South Africa.

The sample of the present study comprises the four largest commercial banks in South Africa that comply with South African reserve bank (SARB) policies and regulations. The selected banks namely Absa, FirstRand, Nedbank and Standard Bank are all registered at Johannesburg Stock Exchange (JSE). The chosen sample is accurate and appropriate as it represents over 86% of the South African banks' population (SARB, 2018). The four banks have subsidiaries in each province and city metropolitan in South Africa. The sampling customer will be both businesses and individuals that have bank accounts in the four biggest South African banks. The total targeted sampling can be estimated to ten (10) metropolitan and about 480 people in South Africa. provinces, ten (10) cities.

4.4 Data Collection

The current study uses both primary and secondary data to achieve accurate research findings. Primary data used in this study are obtained through questionnaires and/or interviews with respondents who have an account at Absa, Nedbank, FNB and Standard bank. Respondents' account type created in these banks were personal, business or investment accounts. Data was collected form respondents across the targeted sample. The Likert scale questionnaire method was used to collect data from the respondents from the big four South African banks across the sample. The Likert scale has five (5) responses namely strongly disagree, disagree, not sure, agree and strongly agree.

Secondary data are obtained from the websites of each South African bank. The study equally uses data collected from the various annual reports of the selected commercial banks namely Absa, FirstRand, Nedbank and Standard bank as published in their websites from 2010 to 2019. Data collected from those websites were similarly compared to the financial reports issued by the South African Reserve Bank (SARB) using the BA900. This study uses financial ratios analysis (FRA) to measure South African banking performance from 2010 to 2019.

The current study uses non-financial indicators that equally influence banking performance in South Africa. Table 4.2 below lists digital performance variables and their measurements as collected from reports and statements published by each South African bank in their annual reports and financial statements.

Table 4.2: Banking performance variables measurement

Banking Performance	**Measurements**
Digital Performance	ATMs; Internet Banking Customer; CellPhone Banking customers; Total IT spend; Core Network Availability
Strategic Performance	Headline earnings per segment
Risk Performance	Capital Adequacy Ratio
Environmental Performance	Energy consumption, CO2 emissions, green buildings
Socio-Economic Performance	Permanent employees; Absenteeism rate; Training spend; EOS customer focus
Economic Equity	B-BBEE status; Percentage of female employees; Percentage of African, Coloured and Indian employees; Total socio-economic development spent
	Financial literacy Initiatives – Number of customers reached
Environmental Performance	Total Carbon Footprint (Tonnes CO2); Green buildings
Sustainable Development	Number of Awards
Customer Experience	Number of customers using digital channels
Customer Satisfaction	Customer satisfaction index

Source: Author's Compilation

It is important to note the fact that since 2017, Barclays Africa naming was changed to Absa Group limited and the Absa brand is consequently refreshed in Africa. Additional information on Absa were collected from the Barclays annual reports under the report society unit.

Biography Profile

The study will use the following biographical elements to further measure the percentage distribution of the digital banking variables following demographic attributes.

Age Bracket: This criterion allows to identify the number and the percentage of the age bracket of respondents of the digital banking performance survey.

1. Less Than 18
2. 18-25
3. 26-35
4. 36-45
5. 46 and Plus

Gender: This criterion allows to identify the number and the percentage of the gender of respondents of the digital banking performance survey.

1. Male
2. Female
3. Others

Race: This criterion allows to identify the number and the percentage of the race of respondents of the digital banking performance survey.

1. Black
2. White
3. Coloured
4. Indian
5. Other

Education Level: This criterion allows to identify the number and the percentage of the education level of respondents of the digital banking performance survey.

1. Less Than NQL5
2. NQF Level 5
3. NQF Level 6
4. NQF Level 7
5. NQF Level 8 or More

Job Experience: This criterion allows to identify the number and the percentage of the job experience of respondents of the digital banking performance survey.

1. < one year
2. Two years
3. Three years
4. Four years
5. Four years and more

Job Place: This criterion allows to identify the number and the percentage of the job place of respondents of the digital banking performance survey.

1. FNB Bank
2. Absa Bank
3. Nedbank
4. Standard Bank
5. Other banks
6. Private or Public Sector
7. Business Owner
8. Unemployed

My/SA Banks: This criterion allows to identify the number and the percentage of the respondents that have a bank account in the big four banks during the digital banking performance survey. The study added the "Other SA banks" for clarity purposes.

1. FNB Bank
2. Absa Bank
3. Nedbank
4. Standard Bank
5. Other banks

4.5 Data Analysis

Data analysis will be conducted by means of using statistical software package SPSS version 26. Descriptive statistics will be used to analyse and build up efficient digital banking framework. Lastly, correlational analysis through the Pearson coefficient of correlation will be used to determine whether there is a relationship between bank performance variables. As non-experimental research, the current study involves both descriptive and correlational research

methods. Descriptive statistics will be used to present the best ratio variables that reveal optimal bank performance and for digital business model analysis while Correlational design is used to test research hypothesis.

Regression analysis tool will be used to determine the P-value at a degree of significant of 5% ($\alpha = 5\%$) to conclude on hypothesis testing. If P-Value < α, reject the null hypothesis. If P-Value > α, accept the null hypothesis.

Crosstabulation analysis will be used to analyse relationship between the biography profile and the digital banking performance variables. The skewness and kurtosis analysis will be done to elaborate on the central tendency distribution. Trend analysis is used to analyse and compare the four banks performance variables during the last decade from 2010 to 2019.

This research design is appropriate because the study seeks to establish if there is an efficient relationship between bank performance and digital banking variables (Salkind, 2012) as presented below:

Table 4.3: Digital Banking variables

Description	**Dependent variables**	**Independent variables**
Digitalisation	Digital Strategies	Digital Bank performance
	Digital Technological Innovation	Digital Bank performance
	Customer Experience	Digital
Business process reengineering	Business process reengineering (BPR)	Digital Bank performance
Digital Banking Framework	Digital Banking Framework	Digital Bank performance

Source: Autor's Compilation

The digital banking process reengineering will be designed and analysed using the below symbols as established by Microsoft Visio professional. The study will compare traditional, reengineered and future processes to highlight the level of digital change. Microsoft Visio Professional includes flowchart techniques for end-to-end process between stakeholders.

Source: Visio Professional

Figure 4.4: Flowchart Symbols

Financial Ratios Calculation

Table 4.4 below shows the calculation of financial ratios use in this study to analyse financial banking performance in South Africa.

Table 4.4: Financial ratios calculation

Financial Ratios	**Calculation**	**Minimum Percentage**
Return on Equity (ROE)	Net Income/Equity	1%
Return on Assets (ROA)	Net Income/Assets	1%
Cost-to-Income ratio (CIR)	Total Cost/Total revenues	50%
Capital Adequacy Ratio (CAR)	(Tier 1 Capital + Tier 2 Capital)/ Risk Weighted Assets	10% (Basel III Requirements)

Source: FNB (2019)

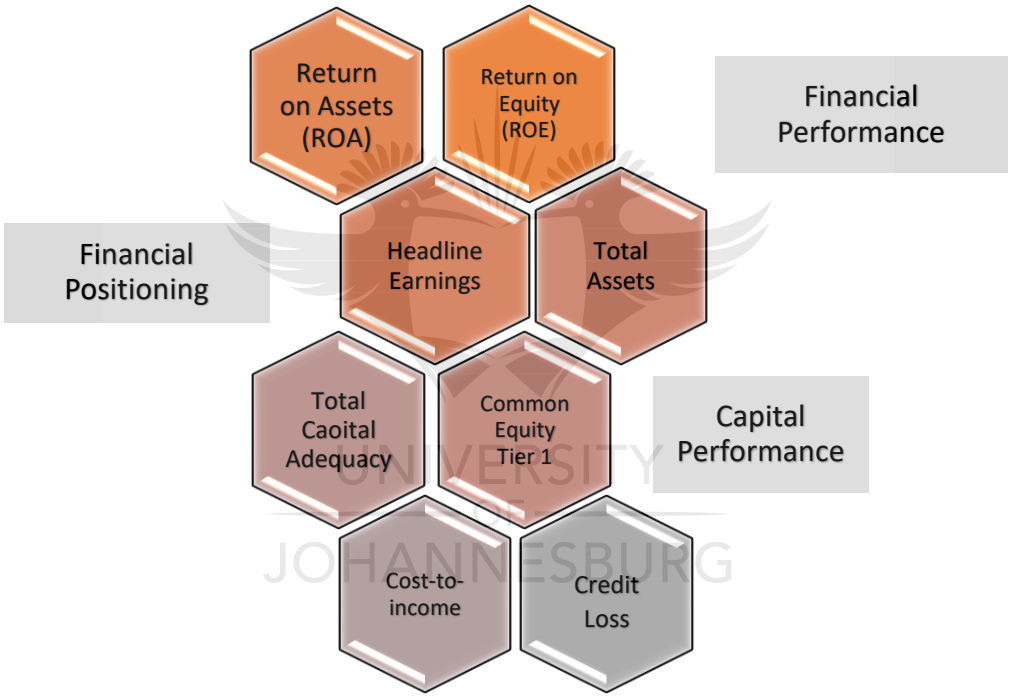
Financial ratio analysis (FRA) is an accounting approach that is used to analyse financial figures disclosed in the financial statements and annual reports. This study asserts that the used of FRA as financial instruments is reliable and valid because it has already been used in previous accepted and published studies. Bank performance measures the ability of any bank to generate sustainable profits over time whether in or off-balance sheets. Financial performance can be measured using the following ratios as stated by Kumbirai and Webb (2010), Brigham and Daves, (2010).

Table 4.5: Financial performance variables

Variables	**Ratio**	**Symbol**	**Equations**
Bank Performance	Return on Assets	ROA	Net profit / Total assets
	Return on Equity	ROE	Net Profit / Total equity

Source: Own Compilation

The current research only uses return on equity to measure financial performance since all South African banks refers to it as the most accurate ratio to inform about their banking performance. Known as the most important ratio, Return on Equity (ROE) indicates the return on common equity (Brigham & Daves, 2010). This suggests that the higher the return on equity, the more profitable the bank is. This dissertation additionally uses other financial ratios that gives detailed financial situation namely return on assets, cost-to-income, credit loss, common Equity Tier 1 and the total capital adequacy ratios. The total assets variable and the headline earnings are used as financial aggregates to compare South African banks in the financial sector.



Source: Own Compilation

Figure 4.5: Digital Financial Performance Indicators

4.6 Reliability and Validity

Validity and reliability of a study is useful in showing legitimacy that refers to the means by which empirical measure are significant as stated by (Babbie, 1995; 4-127). The current study will evaluate with accuracy every questionnaire and variable of the study using the Cronbach' Alpha test. In order to ensure reliability and validity of this study, research design through questionnaires and research method such as descriptive statistics applied in the previous and

published studies will be test using the using the Cronbach' Alpha tool. In addition, the SPSS accredited program is advised by universities for reliable statistic data analysis.

4.7 Ethical considerations

Ethical considerations in research emphasize on participants respect and on data sources acknowledgment. The present study uses a letter of consent for people participating on the questionnaire. This study will follow the University of Johannesburg policy on infringement and plagiarism by acknowledging all sources according to the Harvard Referencing method. Benefits of the research will be shared with the customer and the banks in order to enhance their performances.

4.8 Limitations of the study

This study focuses on the big four banks that drive the oligopolistic financial market in South Africa. Research results will not be applicable to other South African banks in the same banking industry since there is a huge difference in size and performances. A fully digitalised bank whether locally or international could be used as benchmark to effectively highlight remaining distance in the trajectory towards the digitalisation roadmap. Furthermore, a comparative analysis with another statistical method could increase the value of findings.

4.11 Conclusion

This chapter focuses on the research methodology applied in the research study. Both qualitative and quantitative approaches are used to consequently applied primary and secondary data. Qualitative research approach involves the use of primary data collected from questionnaires and answers in addition to interviews run. Biographical profile analysis, simulation of the automated banking processes as well as banking framework analysis were applied to achieve the qualitative aspect of the research. Quantitative research approach involves the use of secondary data collected from the website of each of the big four South African banks and the South African Reserve banks. Financial ratios analysis as well as performance and sustainable development aggregates analysis were used to complete the quantitative characteristic of the study. Research analysis was done using the statistical software named SPSS version 26. Findings based on the analysis of collected data form part of the next chapters.

CHAPTER FIVE

DISCUSSION AND FINDINGS

5.1 Introduction

Following research principle, this chapter about discussion and findings allows the researcher to provide the outcomes of the research after appropriate statistical analysis. Research findings can be elaborated based on the literature review, data collection and secondary data as well because some information can only be found on secondary sources. Therefore, the current study considers finding based on the literature review and data collection. Findings based on the secondary sources form part of the next chapter.

5.2 Findings based on the Literature Review

Based on the literature review, digital banking performance is mostly made from the digitalisation and the Business Process Reengineering (BPR).

5.2.1 Digitalisation

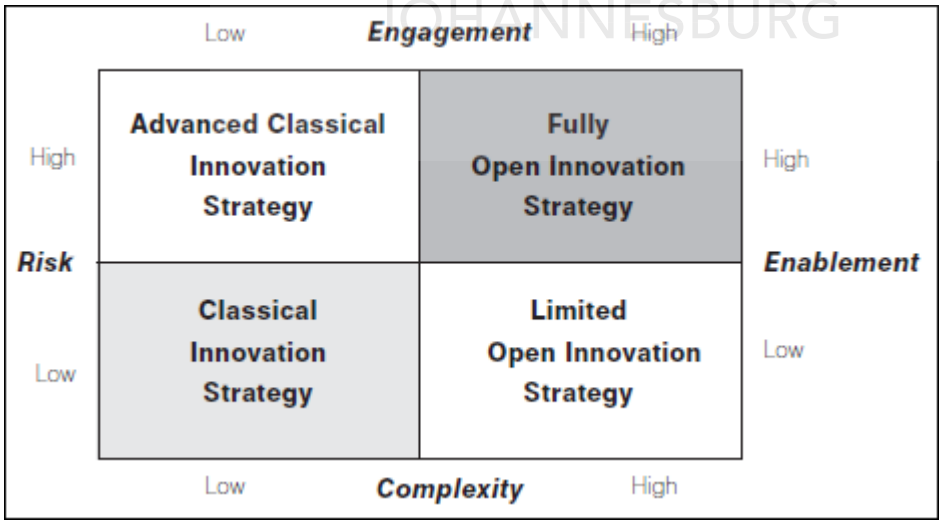
People sometimes assume that using smart technologies lead to a better business performance. But it happens that benefiting from the 4IR requires specific and relevant techniques and methods to tackle associated challenges. In 2017, the international journal of information systems and project management published that companies and organisations must put in place new strategies to facilitate the digital transformation (Søren, Hildebrandt, Tijs, & Marquard (2014)). Since digital disruption goes in hand with innovations in all economic sectors, business and people should be ready for continuous upgrading and updates. The difference in change between the traditional and the digital era has upskilled and change the customers' behaviour. In doing so, customer satisfaction has become the key point while doing digital businesses. In summary, successful implementation of the digitalisation depends on the business strategies applied, the adoption level of the smart technologies and the customer behaviour.

5.2.1.1 Digital Strategies

Compared to traditional strategies that were stable for a long period of time, digital strategies evolve everyday creating unstable environment with enormous challenges. Digital strategies are new strategies capable to manage the digitalisation requirements such as disruptive change,

external digital opportunities and business development. Although digital strategies are not stable, companies do not have another choice than dealing with the global aspect that increase risks. Whether companies and organisations accept it or not, adopting the digitalisation is the only way to revenue growth through technology innovations, cost saving and new markets entrance. Following the SWOT approach, definition of business strategies become easy for businesses while considering the impact of the macroenvironment and the microenvironment (Porter, 2008). Companies thus develop their digital business strategies through upgrade of the standard ones and inclusion of the emerging ones. Since there is a continuous upgrade of smart technologies and customer behaviour, companies must define agile and flexible strategies that is aligned to the volatile environment and thus ensure for long-term survival.

The 4IR boosts digital innovation practices that transform business management in all economic sectors at the national and global levels. This suggests that digital innovations are open to the market regardless of the competitive edge. According to the OECD (2008), businesses must know their market status before engaging with open innovation strategies. They found out that companies must define the degree of openness according to their level of technology, autonomy, risk management, dissimilarity in technologies, time management, products and services offered. Somehow, the more the business becomes complex, the more the increasing risk that force company to develop fully or limited open innovation strategy. At the lower-level business can go for advanced classical or classical innovation strategy respectively if the enablement is high or low as displayed on the figure 5.1 below.

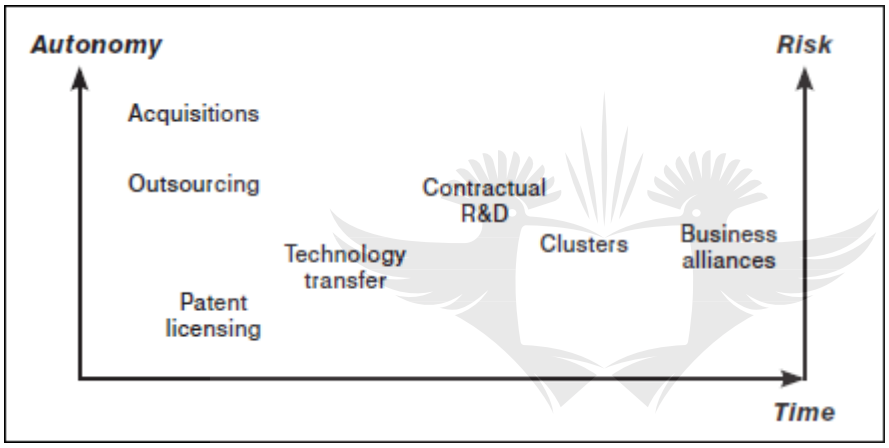


Source: Søren, Hildebrandt, Tijs, and Marquard (2014)

Figure 5.1: Innovative strategies model

Digital strategies include open technology innovation strategy which is not benefit because most of the companies are not aware of their innovation potential, the need for change and the impact of the external competitors. A better solution for companies is to manage digital change and develop capacity of creating digital products and services. According to Jemala (2010), companies and organisations are not willing to disclose their research and development intellectual property or their patents because of a lack of protection from the government sides.

For both standard and digital emerging strategies, businesses should develop methods to increase their profitability over time. According to Jemala (2010), a company can gradually go for outsourcing, technology transfer, contractual R&D, clusters and business alliances when the business grow if the autonomy and the related risk can still be well-managed.



Source: Jemala (2010)

Figure 5.2: Business growth mechanisms

On the financial institutions side, financial strategies should be more scrutinised because of growing pressure from regulations and new financial technology also known as Fintech. This suggests that banks must well-organised their financial strategies to sustain the economy of the country. Selected strategies should meet the objective of better competitive edge, cost-cutting, profit increase and customer care altogether (Deloitte, 2015). Such complexity tends to fail implementation of digital strategies.

5.2.1.2 Traditional or classical Strategies

Also, as conventional strategy, traditional strategies have always ruled businesses with considerable and positive results. According to Parviainen et al. (2017) business should follow the followings strategy step to benefit from the digitalisation in practice.

- Positioning the business in the digitalisation

- Defining goals for the business
- Compare existing business state against the digitalisation requirements
- Define and implement a roadmap for reaching the goals

Observations showed that market leading businesses were forever leaders with a strong competitive advantage compared to new companies that could not rise at all. This suggests that traditional strategies were stable for an economic sector leading to oligopolistic market.

5.2.1.3 Comparison between traditional and digital strategies

Digital strategies are influence by the global change networks and the open technology advancement compared to the traditional that was internal and for specific sector.

Some companies go for the advanced traditional strategies through adjustment of the existing classical strategies while others choose the open innovation strategies with limitations. Whether traditional or digital, effective business strategies should include risk management as the critical part of the business growth. Management risks related to the digitalisation have to be identified, mitigated and monitored to limit the negative impact on the business (Beziade & Assayag, 2014). Evidence in South Africa demonstrated that many businesses closed down during the first phase of the digitalisation implementation. Reason being that strategies were not well-structured.

It is very important to mention that the country challenges drastically affect banking strategies and productivity. Evidence from European banking industry revealed that digital leverage improves cost management, customer satisfaction and financial growth. Since developed banking industry can be used as benchmark for bank in their development stage as the South African banks. Research conducted by the BearingPoint Institute showed that less interest income, tougher regulations, growing competition and demanding customers are the major challenge of the banks. Hopkins, Shirley and Hoptins (1997) argued that strategic planning intensity has a positive, direct and significant impact on the bank performance.

5.2.2.4 Smart Technologies

Smart technologies constitute the key part in the process of getting digitalised. Some companies choose to change their core business and get aligned with digital products and services while other companies prefer buying digital products and services. For a company to claim to be digital, the following should be used and applied on the business:

- Using internet and mobile platforms

- Using specific software or solutions to automatically run the business.
- Engaging with new business approach and culture
- Installation of upgrading IT system infrastructure and architecture platform
- Digital upskilling of employees

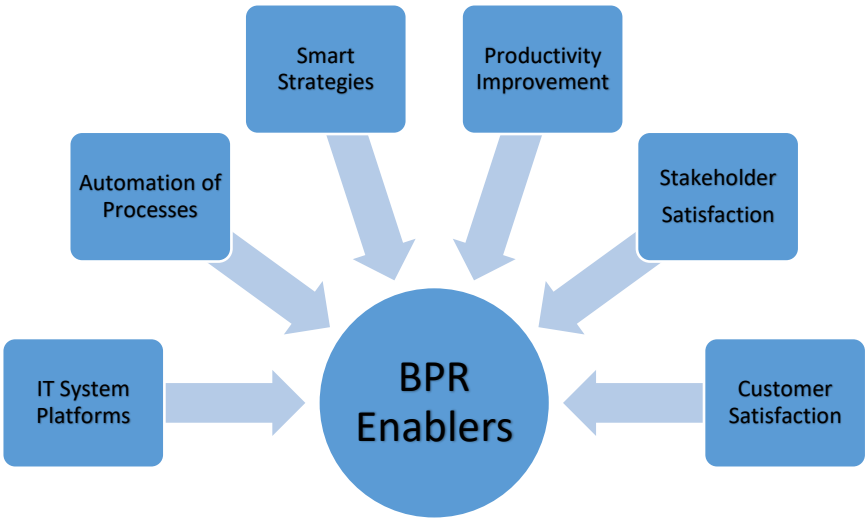
Businesses as well as customers are tempted by the need of becoming expert in using or creating smart technologies. Hence the rise of digital competitors changing standard market tendencies. In South Africa, the big four banks are struggling to keep their leadership since the other are getting digitalised at the same rate and there are new Fintech companies in the financial market (Oracle, 2018). In few years to come, financial market will move from the monopole or oligopolistic to become a perfect market competition. In this case banks will count of the economies of scale to maximised profits and develop long term survival.

5.2.1.5 Customer Experience

Compared to previous customers that were loyal to the bank whatever the level of the service delivery, current customers also named as digital natives are very demanding. Smart technologies and the social medias have contributed to the increase of the customer knowledge. Banks that have long-term goals should mind customer' behaviour to be ahead of their expectations. Customers constantly learn more about smart technologies because of the existence of multiple channels of communication.

5.2.2 Digital Business Process Reengineering in South Africa

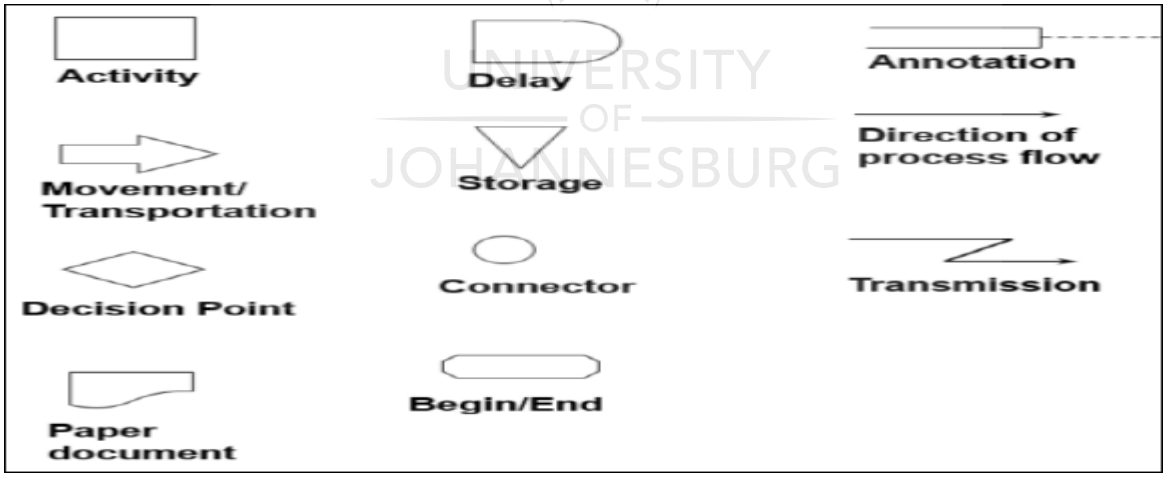
At the current stage, transformation of business processes must be done and must be aligned to the new digital ecosystem. Additionally, achieving customer satisfaction requires execution of the well-organised business strategies. This implies that restructuration of business processes allows not only to ease banking processes for all stakeholders but also mostly to improve productivity and profitability. As confirmed by Dale (1994), smart innovations through reengineering of business processes equally help the company to develop sustainable competitive advantage and market positioning. Figure 44 depicts critical elements such as IT system platforms, process automation, smart strategies, productivity improvement, stakeholder and customer satisfaction that represents BPR enablers.



Source: Own Compilation

Figure 5.3: BPR Enablers

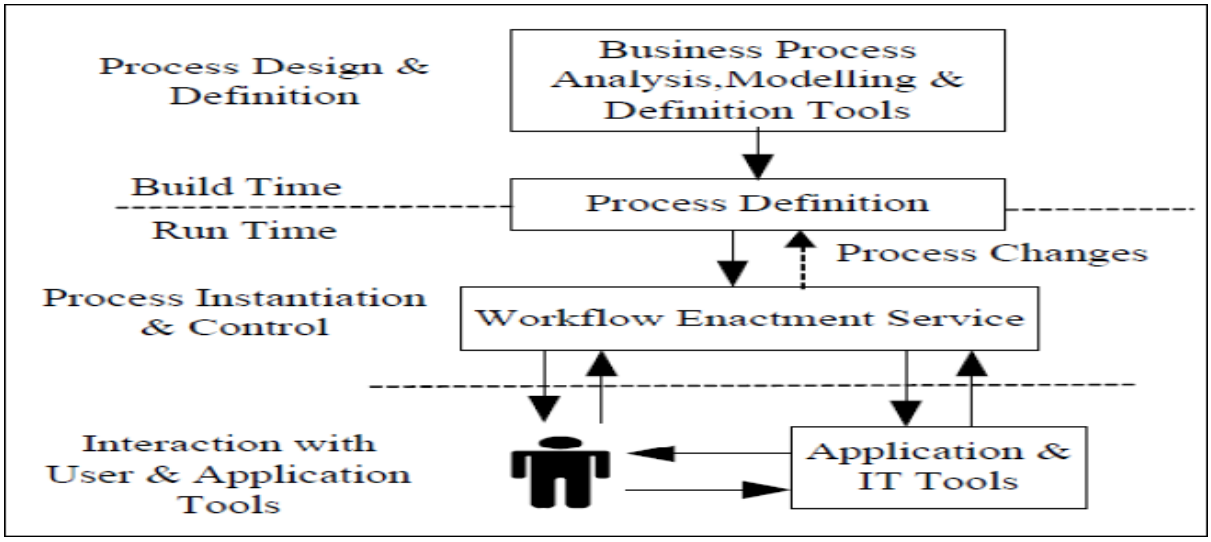
The use of IT system Platforms allows to manage workflow integration between legacy systems, the database and the management solutions. Since business flows are used to easy communication between people and the business activities, specific symbols are used for language communication. Figure 5.4 below displays workflow chart symbols used by Minder (2011) to design business processes.



Source: Minder (2011)

Figure 5.4: Flowchart Symbols

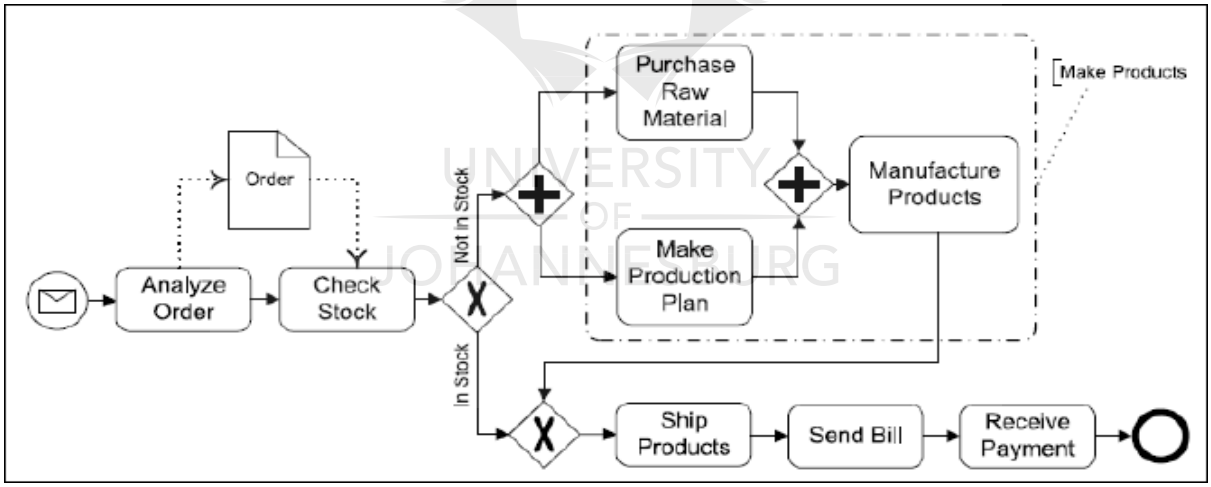
Workflow management is important because it also triggers email notifications that remind people in the sign and/or proceed with the next task wherever they are. Figure 5.5 below detailed workflow system characteristics and shows that workflow notifications automatically facilitate communication between users and complete business transitions at the back-office.



Wen and Chen (2011)

Figure 5.5: Workflow system characteristics

It is important to note that the use of workflow characteristics is one element of the business process modelling. Figure 5.6 below depicts an example of business process modelling notation (BPMN) using flow chart techniques as designed by Edrawsoft (2017).



Source: Edrawsoft (2017)

Figure 5.6: Business Flowchart expressed in BPMN

The above flowchart shows that a particular business process starts with a message or email notification using workflow notification and end with a receive payment. The drawing of a kite with a "+" inside symbolise a decision step that is once again ruled by the workflow notification. Standard business step is symbolised by the rectangle sign. End-to-end process that can be completed in one functional unit in one department or across departments. For

example. The above diagram goes across procurement, manufacturing and the payment departments.

5.2.3 Digital Banking Framework in South Africa

Evidence from multiple researches shows that successful banks always run their financial business according to specific framework whether based on a macro or microenvironment. Thorne and Du Toit (2009) argued that some banks failed to grow because of a lack of consideration of the impact from the environment, governance and management, mandate, regulations and supervision, performance assessment and financial sustainability. Figure 48 below displayed detailed structure of the critical dimensions principles that form part of the sound framework for bank development as explained below.

Performance assessment principle: It must include consistent assessment, financial efficacy, social outreach and related impact.

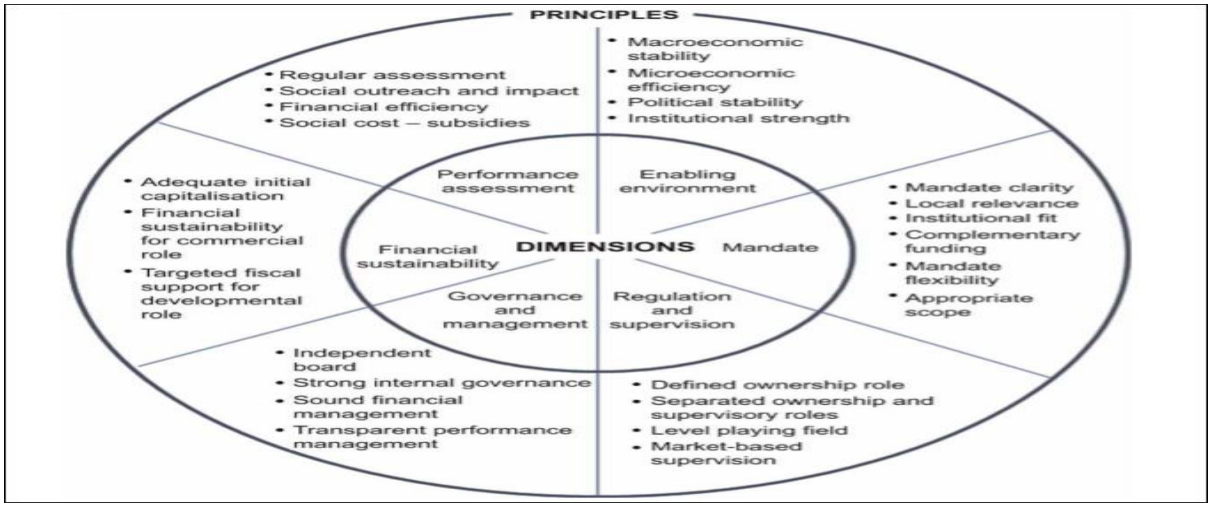
Enabling environment: It must comprise macroeconomic stability, microeconomic proficiency, political stability and institutional supremacy.

Financial sustainability: It must involve targeted fiscal support for developmental role as well as sustainability for commercial role.

Governance and management principle: It must contain self-governing board, durable internal governance and transparent performance management.

Regulation and supervision principle: It must consider the level playing field, the market-based supervision and separated ownership and supervision roles.

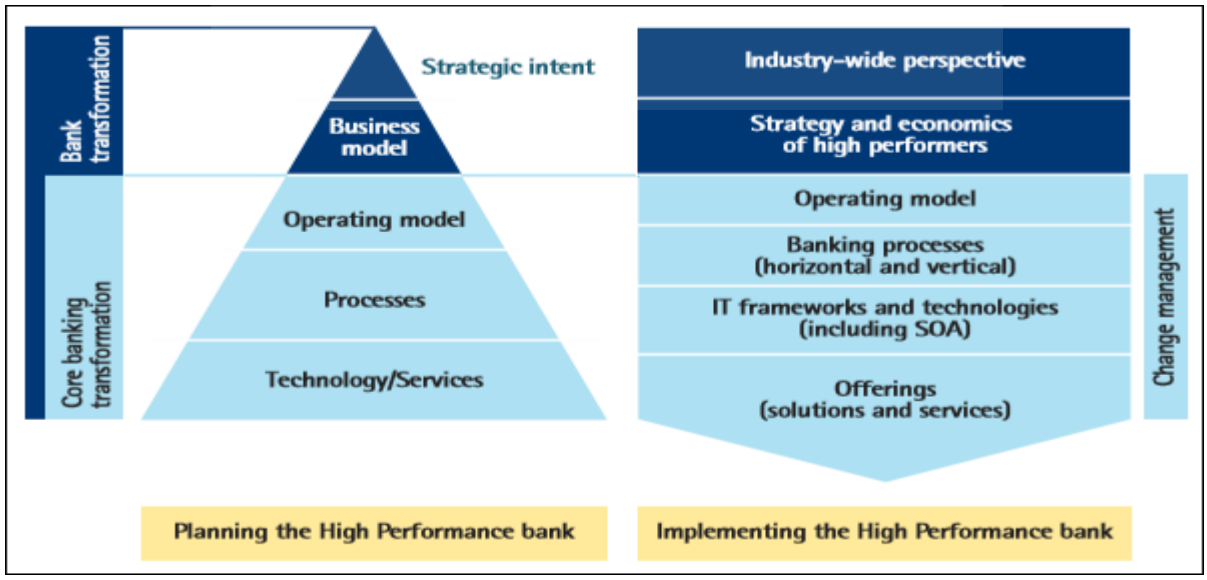
Mandate principle: The framework should have mandate clarity, mandate flexibility and the institutional fit.



Source : Thorne and Du Toit (2009)

Figure 5.7: Macro-Framework for bank Development

Figure 49 depicts a banking transformation framework as designed by Accenture (2018). They found out that banking digitalisation starts with the core banking activities before reaching the transformation of the bank itself through proper change management. At the planning stage, the core banking transformation involves operating model, process and technological services whereas at the implementing phase, it includes more components such as the horizontal and vertical banking processes, offerings and the IT frameworks and technologies (Accenture, 2018). Specific strategic intents are deployed during bank transformation that only involves business model at the planning stage. At the implementing phase, industry-wide perspective as well as strategy and economics of high performers are put into place.



Source: Accenture (2018)

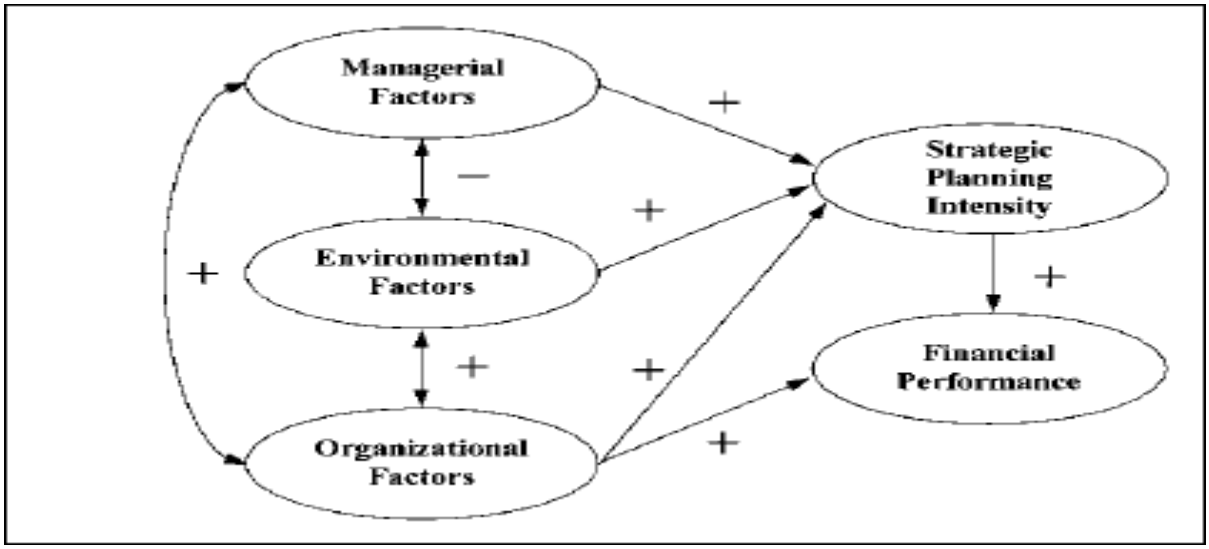
Figure 5.8: Banking Transformation Framework

There are more results in implementing profitability based on enterprise performance management (EPM) frameworks as argued by PWC (2020). Figure 50 below represents the EPM framework that help banks to bring predictable contribution to sustained value creation. They established that value creation is made from the combination between strategy development, performance measurement, reporting and review in addition to the staff incentive compensation.

Source: PWC (2020)

Figure 5.9: Enterprise Performance Management (EPM) Framework

An appropriate performance management framework should include responsibility structure, operational strategies, data management and most importantly the embedding of performance-driven behaviour. According to Hopkins, Shirley and Hoptins (1997), a relevant banking framework should include the financial performance element itself and its correlated factors that enhance the performance. They argued that managerial, environment and organisational factors are linked to the strategic planning intensity and all of them are the catalysers of the financial performance as displayed on figure 51 below.



Source: Hopkins, Shirley and Hoptins (1997)

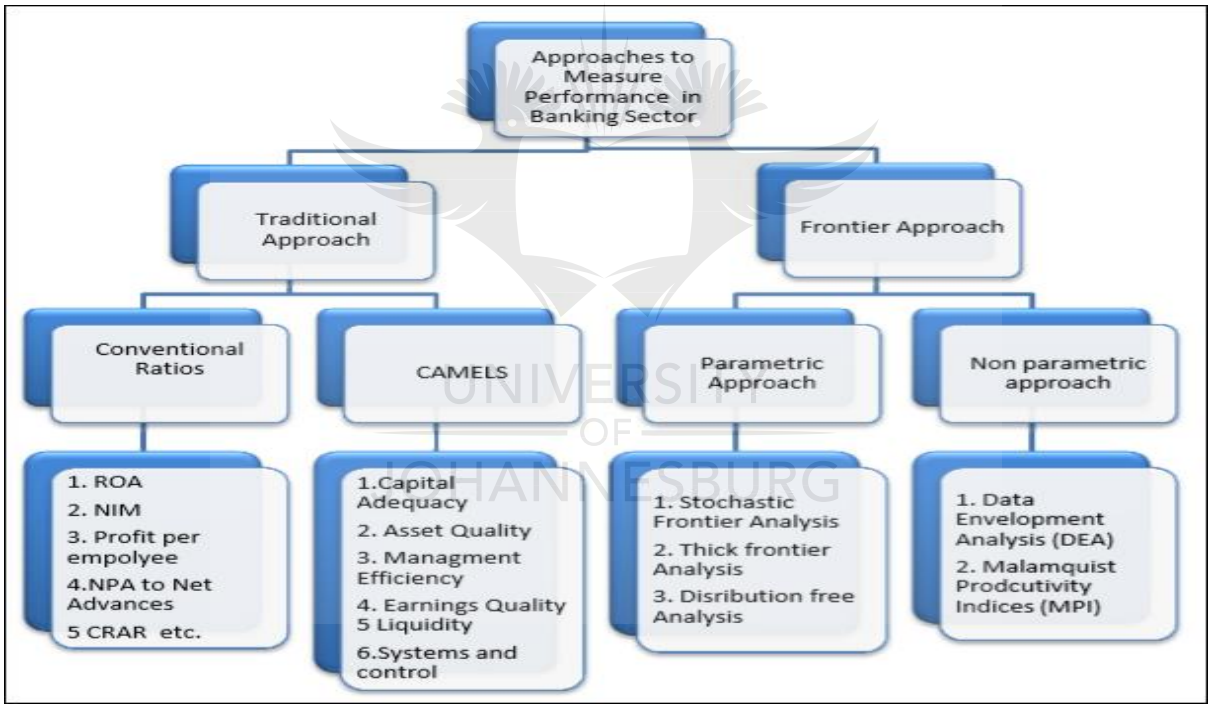
Figure 5.10: Model of planning-performance relationships in banks

In summary, few researches have been done on the topics related to banking performance framework in South Africa. The above ones were too focused on a specific branch of activities without putting together all the components of the business. However, findings from the review of literature revealed that banking performance framework must integrate policies, process and the validation governance in addition to the audit certification to ensure successful implementation.

5.2.4 Banking performance in South Africa

Performance of South African banks has developed dependency to the digitalisation adoption and upgrade as well as global banking development. Since the roadmap to a completely digitalised banks requires complex transformation and change in steps, banking performance evolves accordingly. From digital pioneers where banks are fully digitalised to digital laggards where bank still rely on their legacy IT systems, South Africa holds the status of digital shy banks (BearingPoint Institute, 2018). Commercial banks that hold a digital shy status are at the middle way on the roadmap towards full digitalisation and they have automated banking processes as well as the stability of online banking. The trajectory to the fully digitalised banks should include cloud computing, incubators, big data and analytics and finally to upgrade payments mechanisms. This implies that existing banks should partner with new fintech companies to survive in the next-generation banks as argued by the BearingPoint Institute (2018).

In the South African context, bank performance is closely related to banking profitability and the profitability itself depends on the market structure and the competition (Simatele, Mishi & Ngonyama, 2018). This means that South African banks are profitable since the banking sector is oligopolistic without too much concentration in the financial market. Following es, banking performance are measured through financial ratios namely return on assets (ROA), return on equity (ROE) and net interest margin (NIM). Other authors argued that bank performance should be assessed through control and risk financial ratios such as loans to assets (LTA), loan loss reserves to gross loans (LORG), cost to income (CTI), revenue concentration within each bank (RevC), deposits to total assets (DTA) and the total equity (Simatele, Mishi & Ngonyama, 2018). According to Hopkins, Shirley and Hoptins (1997), financial performance of banks is influenced by managerial, environmental and organisational factors with a significant impact from the strategic planning intensity.



Source: Financial stability board (2017)

Figure 5.11: Performance Measurement Methods

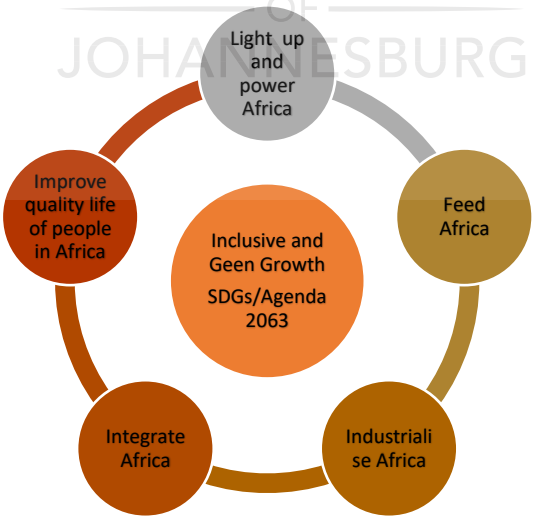
Bank performance indicators differ from the type of banks namely commercial, depository, private and universal banks. KPMG (2020) published that the principal key performance indicators are the operations cot versus income, ROE, ROA, average interest margin, average commission margin, employee costs, net profits and the volume of assets. According to the AFDB (2020), banking performance is not only measured using financial ratios but also its

environmental impact through inclusive and the green growth. Table 5.1 and figure 5.12 below displays inclusive and green growth and their measurements criterion.

Table 5.1: Dimensions of the incluse and green growth

Inclusive Growth	Measurements	Green Growth	Measurements
Economic inclusion	GDP per Capita, poverty and income inequality	Building resilience and adapting to a change environment	Hungry and malnourished people Resilience to water shocks
Spatial Inclusion	Roads, electricity, water and health services	Managing natural assets efficiently and sustainably	Agricultural productivity Cereal yield
Social Inclusion	Education, health and labour market	Promoting, sustainable infrastructure	CO2 emissions Renewable energy capacity
Political Inclusion	Quality of institutions, taxation and inclusion of women		

Source: Afdb (2020)



Source: Afdb (2020)

Figure 5.12: Inclusive and green growth performance for Africa

For South African banks to partner with the African bank development in supporting the 2063 agenda and achieving the sustainable development goals, they must update their operations as follow:

- Increase the quality and rapidity of operations
- Guarantee sound portfolio performance
- Enrich knowledge and advisory services
- Develop close relationship with customers to boost delivery
- Increase value of the money
- Promote staff engagement, development and efficiency

5.3 Findings based on Data Collection

Digitalisation, business process reengineering and digital banking performance framework are the mechanisms that influence banking performance in South Africa. The upcoming sections provide a detailed view of the biographical profile and the digital banking performance variables following SPSS statistical analysis. But firstly, the validity and reliability test are run to confirm the suitability of the chosen variables that are in the questionnaire in answering the research questions.

5.3.1 Validity and the reliability

This section talks about the validity and the reliability of each digital banking performance variable namely the digitalisation, the digital BPR and the digital conceptual framework. These tests need to be done before carrying out with the inferential statistics. For a validity test to be significant, the inter-item correlation matrix coefficient between variables should be at least 40% (Field, 2009). For questionnaire variables to be reliable, the alpha coefficient on the reliability statistics should have a minimum of 70% as stated by Field (2009).

Validity and Reliability Test - Digitalisation

Table 5.2 below shows that the Cronbach's Alpha coefficient equals to .907 meaning that the digitalisation variables are reliable.

Table 5.2: Reliability statistics - Digitalisation

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.907	.914	4

Source: Own Compilation

Table 5.3 below shows that the digitalisation variables are valid because all variables in the inter-item correlation matrix have a coefficient superior to the threshold of .40.

Table 5.3:Inter-item Correlation Matrix – Digitalisation

Inter-Item Correlation Matrix

	Digital Banking Strategies	Digital Technology Innovation	Digital Customer Experience	Digitalisation
Digital Banking Strategies	1.000	.636	.600	.918
Digital Technology Innovation	.636	1.000	.811	.701
Digital Customer Experience	.600	.811	1.000	.694
Digitalisation	.918	.701	.694	1.000

Source: Own Compilation

Validity and Reliability Test - Digital Banking Strategies

Table 5.4 below shows that the Cronbach's Alpha coefficient equals to .978 meaning that the digitalisation variables are reliable.

Table 5.4: Reliability statistics - Digital Banking Strategies

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.978	.978	7

Source: Own Compilation

Table 5.5 below shows that variables of the digital banking strategies are valid because coefficient between variables in the inter-item correlation matrix is superior to the threshold of .40.

Table 5.5:Inter-item Correlation Matrix - Digital Banking Strategies

Inter-Item Correlation Matrix

	Differentiation	Market Segmentation and Positioning	Customer and Product-Centric	Change-Driven Leadership	Security-Driven Strategy	Data-Driven Strategy	Digital Banking Strategies
Differentiation	1.000	.966	.963	.979	.913	.913	.725
Market Segmentation and Positioning	.966	1.000	.995	.959	.858	.881	.710
Customer and Product-Centric	.963	.995	1.000	.967	.860	.883	.699
Change-Driven Leadership	.979	.959	.967	1.000	.891	.905	.708
Security-Driven Strategy	.913	.858	.860	.891	1.000	.980	.687
Data-Driven Strategy	.913	.881	.883	.905	.980	1.000	.686
Digital Banking Strategies	.725	.710	.699	.708	.687	.686	1.000

Source: Own Compilation

Validity and Reliability Test - Digital Technology Innovation

Table 5.6 below shows that the Cronbach's Alpha coefficient equals to .976 meaning that the digital technology innovation variables are reliable.

Table 5.6: Reliability statistics - Digital Technology Innovation

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.976	.976	11

Source: Own Compilation

Table 5.7 below shows that all digital technology innovation variables in the inter-item correlation matrix have a coefficient superior to the threshold of .40. This implies that digital technology innovation variables are valid.

Table 5.7:Inter-item Correlation Matrix - Digital Technology Innovation

Inter-Item Correlation Matrix

	Internet of Things	Smart Innovations	Smart Devices	Data Analytics	Artificial Intelligence	Digital Banking Channels	Banking Security Measures	Cyber Security Measures	Cloud Domain Architecture	Green Innovations	Digital Technology Innovation
Internet of Things	1.000	.957	.684	.714	.776	.844	.745	.624	.722	.833	.814
Smart Innovations	.957	1.000	.655	.683	.743	.808	.713	.597	.691	.870	.779
Smart Devices	.684	.655	1.000	.958	.881	.811	.919	.912	.769	.570	.798
Data Analytics	.714	.683	.958	1.000	.919	.846	.959	.874	.798	.595	.829
Artificial Intelligence	.776	.743	.881	.919	1.000	.920	.959	.804	.859	.647	.894
Digital Banking Channels	.844	.808	.811	.846	.920	1.000	.882	.740	.855	.703	.965
Banking Security Measures	.745	.713	.919	.959	.959	.882	1.000	.838	.828	.620	.861
Cyber Security Measures	.624	.597	.912	.874	.804	.740	.838	1.000	.712	.520	.736
Cloud Domain Architecture	.722	.691	.769	.798	.859	.855	.828	.712	1.000	.601	.910
Green Innovations	.833	.870	.570	.595	.647	.703	.620	.520	.601	1.000	.678
Digital Technology Innovation	.814	.779	.798	.829	.894	.965	.861	.736	.910	.678	1.000

Source: Own Compilation

Validity and Reliability Test – Digital Customer Experience

Table 5.8 below shows that the Cronbach's Alpha coefficient equals to .951 meaning that the digital customer experience variables are reliable.

Table 5.8: Reliability statistics - Digital Customer Experience

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.951	.955	5

Source: Own Compilation

Table 5.9 below shows that all digital customer experience variables in the inter-item correlation matrix have a coefficient superior to the threshold of .40. This means that digital customer experience variables are valid.

Table 5.9: Inter-item Correlation Matrix - Digital Customer Experience

Inter-Item Correlation Matrix

	Banking and Communication Channels	Manage Demanding Customers	Customer Education and Upgrade	Digital Transformation Support	Digital Customer Experience
Banking and Communication Channels	1.000	.894	.801	.700	.793
Manage Demanding Customers	.894	1.000	.893	.736	.820
Customer Education and Upgrade	.801	.893	1.000	.783	.865
Digital Transformation Support	.700	.736	.783	1.000	.820
Digital Customer Experience	.793	.820	.865	.820	1.000

Source: Own Compilation

Validity and Reliability Test – Digital Banking Process Reengineering

Table 5.10 below shows that the Cronbach's Alpha coefficient equals to .909 meaning that the digital banking process reengineering variables are reliable.

Table 5.10: Reliability statistics - Digital Banking Process Reengineering

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.909	.911	4

Source: Own Compilation

Table 5.11 below shows that all digital banking process reengineering variables in the inter-item correlation matrix have a coefficient superior to the threshold of .40. This means that digital banking process reengineering variables are valid.

Table 5.11:Inter-item Correlation Matrix - Digital Banking Process Reengineering

Inter-Item Correlation Matrix

	Banking Omni-Channels	Process Change Management	Payment Terminals/Businesses	Digital BPR
Banking Omni-Channels	1.000	.657	.472	.680
Process Change Management	.657	1.000	.818	.913
Payment Terminals/Businesses	.472	.818	1.000	.778
Digital BPR	.680	.913	.778	1.000

Source: Own Compilation

Validity and Reliability Test – Digital Banking Conceptual Framework

Table 5.12 below shows that the Cronbach's Alpha coefficient equals to .981 meaning that the digital banking conceptual framework variables are reliable.

Table 5.12: Reliability statistics - Digital Banking Conceptual Framework

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.981	.984	11

Source: Own Compilation

Table 5.13 below shows that all digital banking conceptual framework variables in the inter-item correlation matrix have a coefficient superior to the threshold of .40. This means that digital banking conceptual framework variables are valid.

Table 5.13:Inter-item Correlation Matrix - Digital Banking Process Reengineering

Inter-Item Correlation Matrix

	DBS-DTI-DCE	Digital BPR	IT Project Management	SoS Reengineering/Integration	KBM & Emotional Intelligence	Employee & Stakeholders' Development	Compliance-Laws-Regulations-Acts	Compliance-Socioeconomic and Environmental Requirements	Compliance-Global and Sustainable Development Requirements	Digital Challenge Management	Digital Conceptual Framework
DBS-DTI-DCE	1.000	.825	.893	.748	.732	.810	.841	.846	.843	.861	.910
Digital BPR	.825	1.000	.905	.875	.850	.846	.795	.838	.837	.835	.822
IT Project Management	.893	.905	1.000	.854	.829	.907	.850	.829	.852	.875	.841
SoS Reengineering/Integration	.748	.875	.854	1.000	.821	.828	.752	.811	.877	.880	.812
KBM & Emotional Intelligence	.732	.850	.829	.821	1.000	.934	.917	.890	.757	.779	.789
Employee & Stakeholders'Development	.810	.846	.907	.828	.934	1.000	.933	.879	.810	.834	.817
Compliance-Laws-Regulations-Acts	.841	.795	.850	.752	.917	.933	1.000	.883	.801	.820	.852
Compliance-Socioeconomic and Environmental Requirements	.846	.838	.829	.811	.890	.879	.883	1.000	.802	.843	.909
Compliance-Global and Sustainable Development Requirements	.843	.837	.852	.877	.757	.810	.801	.802	1.000	.946	.908
Digital Challenge Management	.861	.835	.875	.880	.779	.834	.820	.843	.946	1.000	.941
Digital Conceptual Framework	.910	.822	.841	.812	.789	.817	.852	.909	.908	.941	1.000

Source: Own Compilation

Validity and Reliability Test – Digital Banking Performance

Table 5.14 below shows that the Cronbach's Alpha coefficient equals to .933 meaning that the digital banking performance variables are reliable.

Table 5.14: Reliability statistics - Digital Banking Performance

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.933	.947	6

Source: Own Compilation

Table 5.15 below shows that all digital banking performance variables in the inter-item correlation matrix have a coefficient superior to the threshold of .40. This implies that digital banking performance variables are valid.

Table 5.15: Inter-item Correlation Matrix - Digital Banking Performance

Inter-Item Correlation Matrix

	Digital Banking Strategies	Digital Technology Innovation	Digital Customer Experience	Digital BPR	Digital Conceptual Framework	Digital Banking Performance
Digital Banking Strategies	1.000	.636	.600	.733	.720	.959
Digital Technology Innovation	.636	1.000	.811	.684	.704	.665
Digital Customer Experience	.600	.811	1.000	.835	.855	.642
Digital BPR	.733	.684	.835	1.000	.903	.757
Digital Conceptual Framework	.720	.704	.855	.903	1.000	.725
Digital Banking Performance	.959	.665	.642	.757	.725	1.000

Source: Own Compilation

Table 5.16 below gives a summary of the validity and reliability test as detailed in the above section. The Cronbach' Alpha test was run to check and confirm validity and reliability of the research variables.

Table 5.16: Validity and Reliability Test Summary

Variables	**Cronbach 'Alpha Coefficient**	**Reliability Test Decision**	**Inter-item Correlation Matrix - Coefficient**	**Validity Test Decision**
Digitalisation	0.907	Reliable	> 0.40	Valid
Digital banking strategies	0.978	Reliable	> 0.40	Valid
Digital technology innovation	0.976	Reliable	> 0.40	Valid
Digital customer experience	0.951	Reliable	> 0.40	Valid
Digital BPR	0.909	Reliable	> 0.40	Valid
Digital conceptual banking framework	0.981	Reliable	> 0.40	Valid
Digital Banking Performance	0.933	Reliable	> 0.40	Valid

Source: Own Compilation

5.3.2 Biographical Profile

The biographical profiling comprises the age, gender, race, level of education, job experience, job place as well as the "my bank" that represents the SA bank where respondents have a bank account. Table 5.17 below represents the frequency and the percentage of the demographic characteristics.

Table 5.17: Frequency distribution – Biography

Demographic Characteristics		Frequency	Percent
Age Bracket	Less Than 18	29	6
	18-25	51	10.6
	26-35	150	31.3
	36-45	180	37.5
	46 and Plus	70	14.6
Gender	Male	180	37.5
	Female	300	62.5
	Others	0	
Race	Black	130	27.1
	White	120	25
	Coloured	110	22.9
	Indian	120	25
Education Level	Less Than NQL5	170	35.4
	NQF Level 5	110	22.9
	NQF Level 6	100	20.8
	NQF Level 7	90	18.8
	NQF Level 8 or More	10	2.1
Job Experience	< one year	90	18.8
	Two years	100	20.8
	Three years	130	27.1
	Four years	110	22.9
	Four years and more	50	10.4
Job Place	FNB Bank	80	16.7
	Absa Bank	70	14.6
	Nedbank	80	16.7
	Standard Bank	50	10.4
	Other banks	40	8.3
	Private or Public Sector	30	6.3
	Business Owner	90	18.8
	Unemployed	40	8.3

My Bank/SA Banks	FNB	158	32.9
	ABSA	127	26.5
	Nedbank	100	20.8
	Standard Bank	70	14.6
	Others (Please specify)	25	5.2

Source: Author's Compilation

Following are the descriptive statistics that include biographical statistics and the frequency chart namely pie and histogram charts.

Descriptive Statistics – Biographical Profile

Table 5.18 below shows the measure of the central tendency and the dispersion.

Table 5.18: Descriptive Statistics – Biographical Profile

Descriptive Statistics

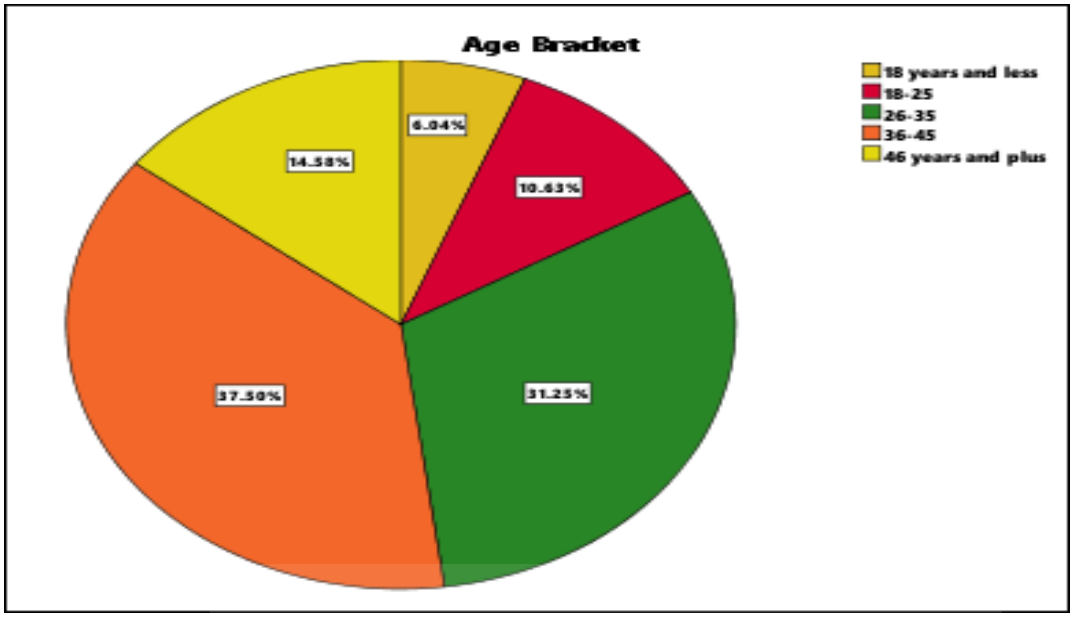
	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Age Bracket	480	4	1	5	3.44	.048	1.056	1.115
Gender	480	1	1	2	1.63	.022	.485	.235
Race	480	3	1	4	2.46	.052	1.137	1.293
Level of Education	480	4	1	5	2.29	.054	1.191	1.418
Job Experience	480	4	1	5	2.85	.057	1.259	1.586
Job Place	480	7	1	8	4.15	.108	2.365	5.595
My Bank	480	4	1	5	2.33	.056	1.219	1.486
Valid N (listwise)	480							

Source: Author's Compilation

5.3.2.1 Age Bracket

Frequency - Pie Chart

Figure 5.13 below shows that among respondents, 6.04% have 18 years old and less, 10.43% have between 18 and 25 years old, 31.25% have between 26 and35 years old, 37.50% have between 36 and 45 years old and 14.58% have more than 46 years old.



Source: Author's Compilation

Figure 5.13: Pie Chart – Age Bracket

Table 5.19 below displays the frequency statistics that describe the shape and the symmetry of the distribution through the analysis of the skewness, the kurtosis analysis their corresponding standard errors.

Table 5.19: Frequency statistics

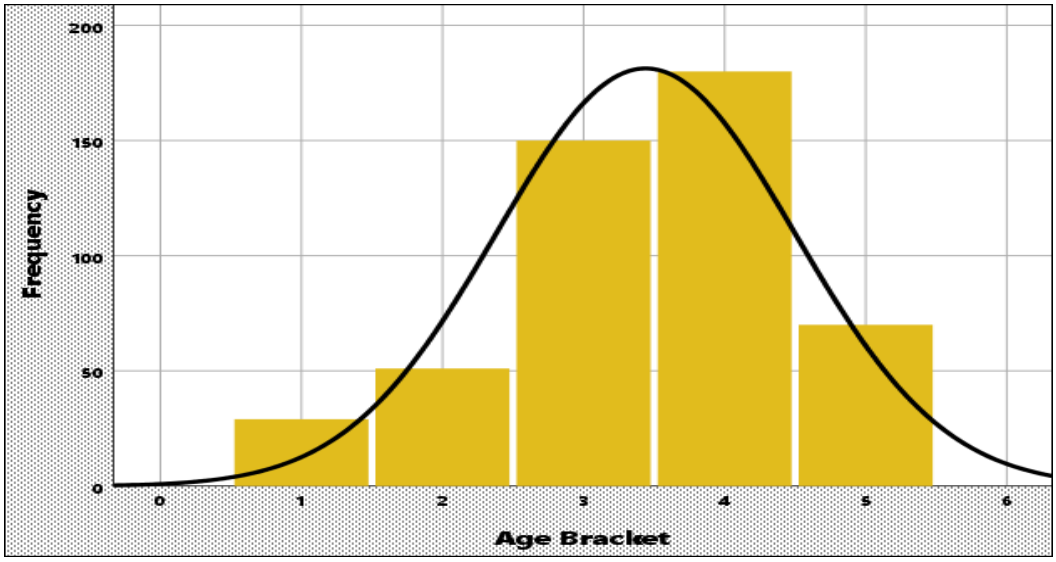
Statistics

		Age Bracket	Gender	Race	Level of Education	Job Experience	Job Place	My Bank
N	Valid	480	480	480	480	480	480	480
	Missing	0	0	0	0	0	0	0
Skewness		-.513	-.518	.061	.390	.025	.205	.535
Std. Error of Skewness		.111	.111	.111	.111	.111	.111	.111
Kurtosis		-.156	-1.739	-1.399	-1.122	-1.030	-1.355	-.781
Std. Error of Kurtosis		.222	.222	.222	.222	.222	.222	.222

Source: Author's Compilation

Frequency - Histogram -Age Bracket

Figure 5.14 below shows that the age profile has a normal distribution with a left long tail since the skewness is negative and close to zero. Its observations cluster less because their kurtosis is negative as well. Additionally, the graph shows a departure from the symmetry because twice its standard error of skewness is more than the skewness value.



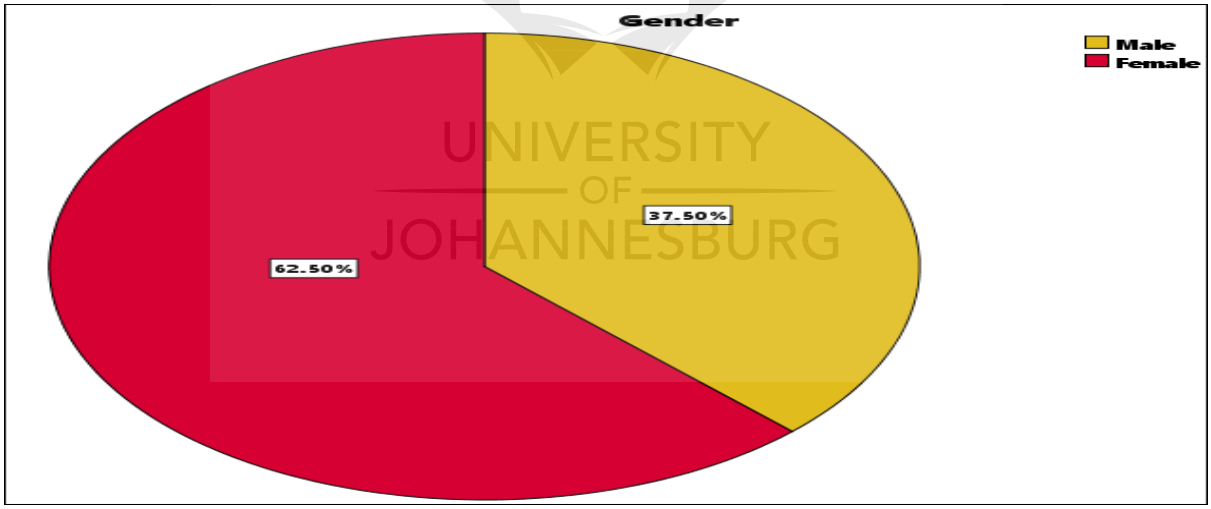
Source: own compilation

Figure 5.14: Frequency-Histogram chart- Age bracket

5.3.2.2 Gender

Frequency - Pie Chart- Gender

Figure 5.15 below shows that 37.50% of the respondents are male and 62.50% are female.



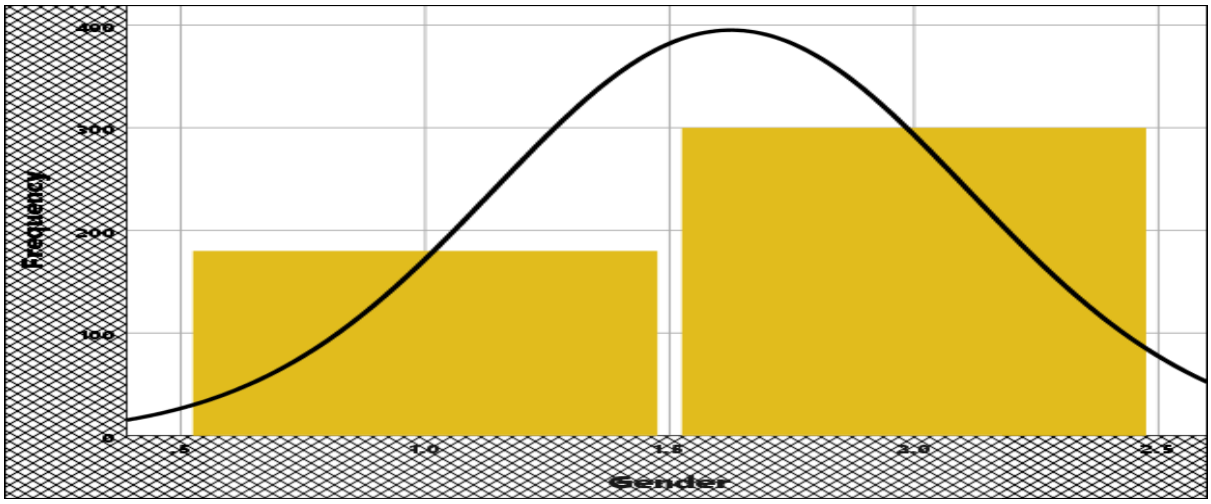
Source: Author's Compilation

Figure 5.15: Pie Chart - Gender

Frequency - Histogram - Gender

Figure 5.16 below shows that the age profile has a normal distribution with a left long tail while the race since the skewness is negative and close to zero. Its observations cluster less because

their kurtosis is negative as well. Additionally, the graph shows a departure from the symmetry because twice its standard error of skewness is more than the skewness value.



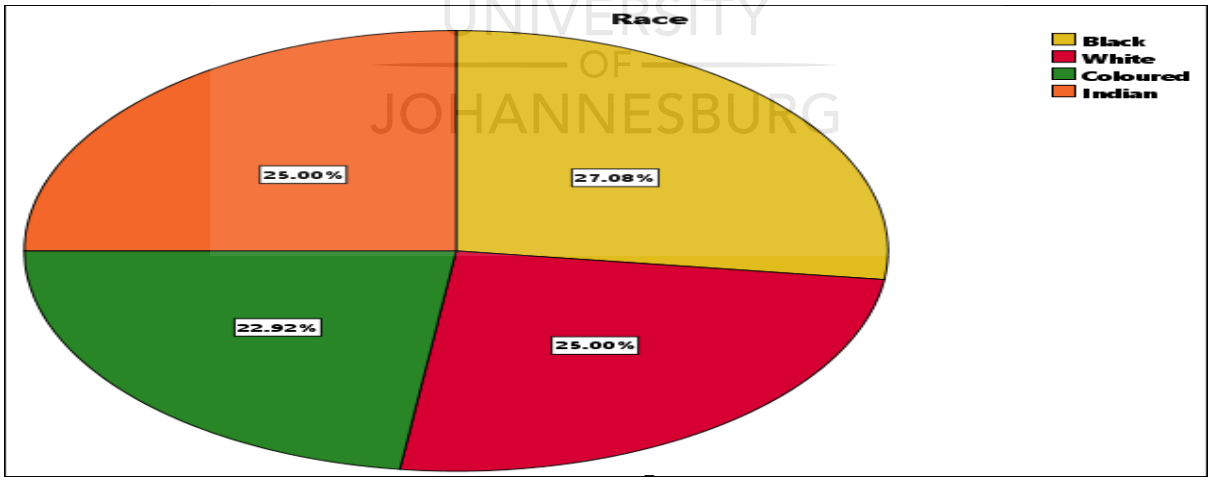
Source: Own compilation

Figure 5.16: Frequency- Histrogram-Gender

5.3.2.3 Race

Frequency - Pie Chart - Race

Figure 5.17 below shows that among the respondents, 27.08% are black, 25% are white, 22.92% are coloured and 25% are Indian.



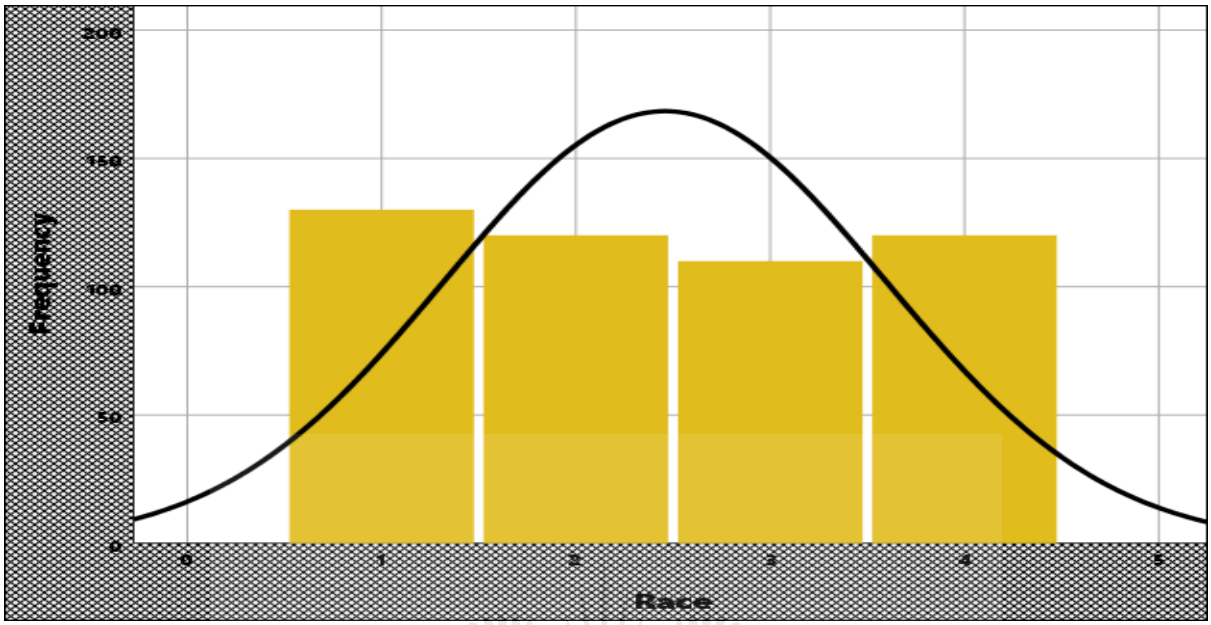
Source: Author's Compilation

Figure 5.17: Pie Chart - Race

Frequency – Histogram - Race

Figure 5.18 below shows that the race profile has a normal distribution with a right long tail while since the skewness is positive and close to zero. Its observations cluster less because their

kurtosis is negative as well. Additionally, the graph shows a slight departure from the symmetry because twice its standard error of skewness is more than the skewness value.



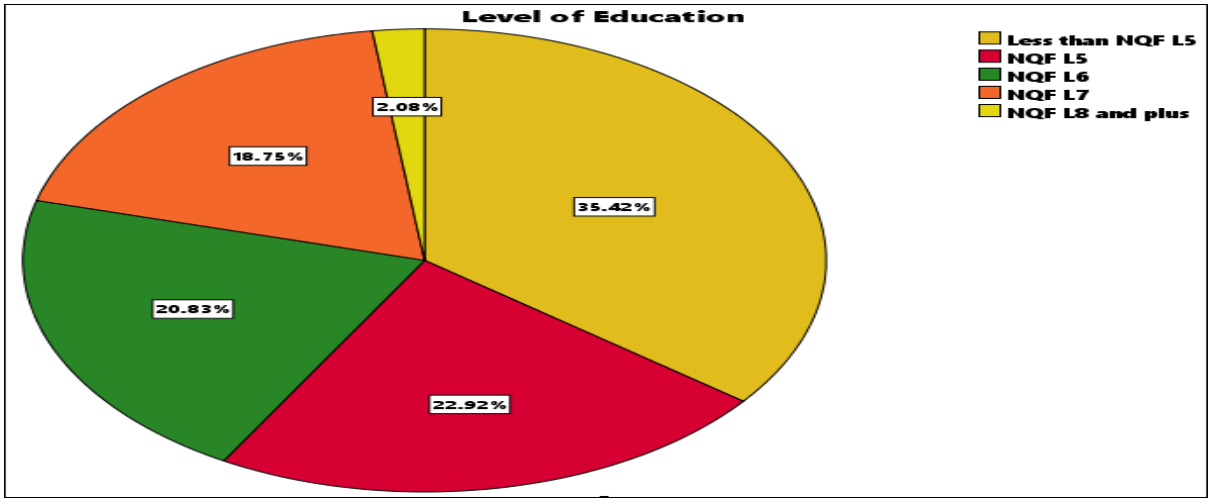
Source: Author's Compilation

Figure 5.18: Histogram Chart – Race

5.3.2.4 Level of Education

Frequency - Pie Chart – Level of Education

Figure 5.19 below shows that 2.08% of the respondents have less than NQF L5 level of education, 35.42% have a NQF L5, 22.92% hold a NQF L6, 20.03% have a NQF L7 and 18.75% hold a NQF L8 and plus.

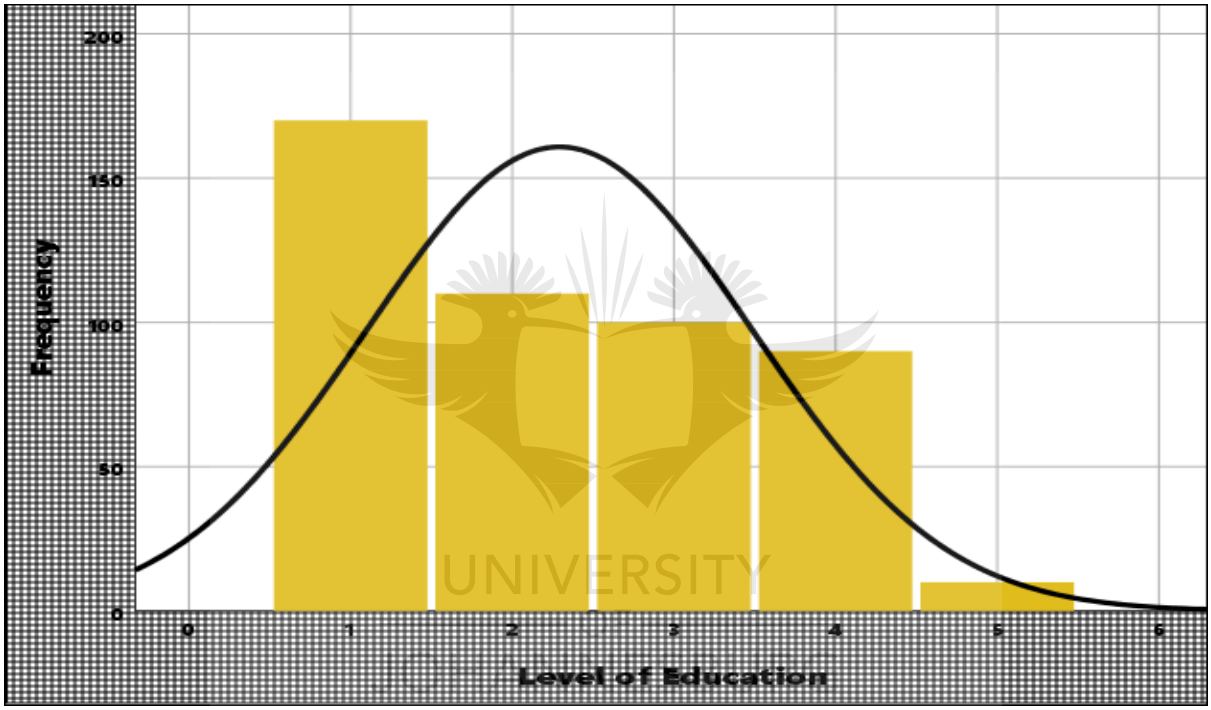


Source: Author's Compilation

Figure 5.19: Pie Chart – Level of Education

Frequency - Histogram – Level of Education

Figure 5.20 below shows that the level of education profile has a normal distribution with a right long tail since the skewness is negative and close to zero. Its observations cluster less because their kurtosis is negative as well. Additionally, the graph shows a departure from the symmetry on the right because twice its standard error of skewness is more than the skewness value.



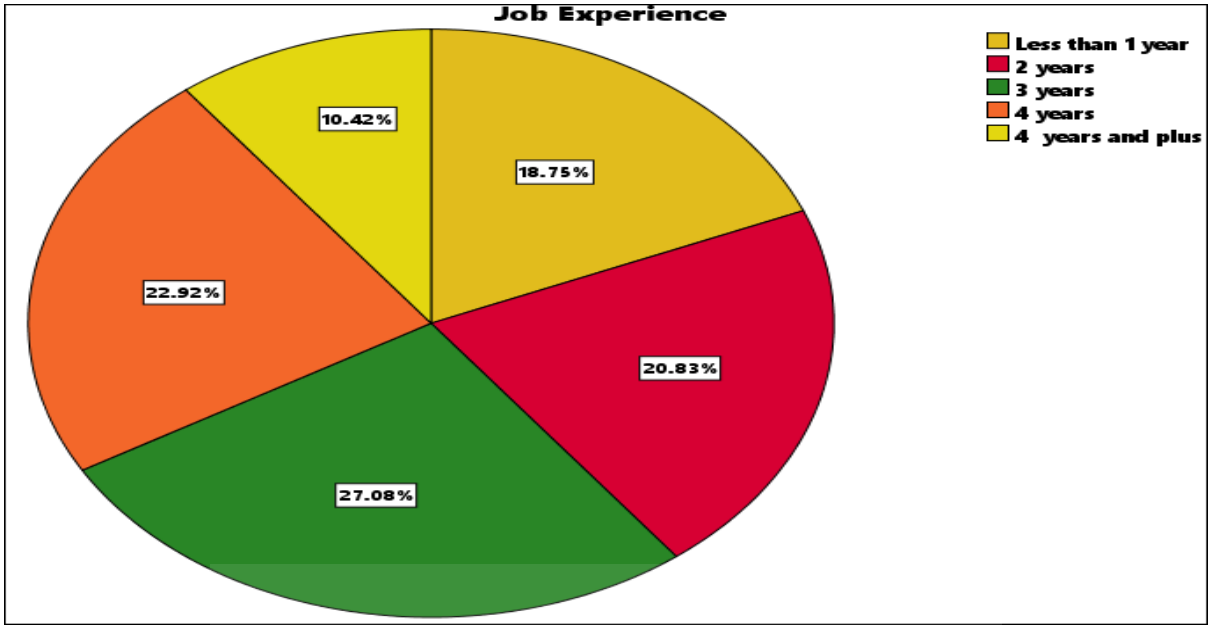
Source: Author's Compilation

Figure 5.20: Histogram Chart – Level of Education

5.3.2.5 Job Experience

Frequency - Pie Chart – Job Experience

Figure 5.21 below shows that 18.75% of the respondents have less than one-year experience, 20.03% have 2 years, 27.08% have 3 years, 22.92% have 4 years and 10.42% have more than 4 years of experience.

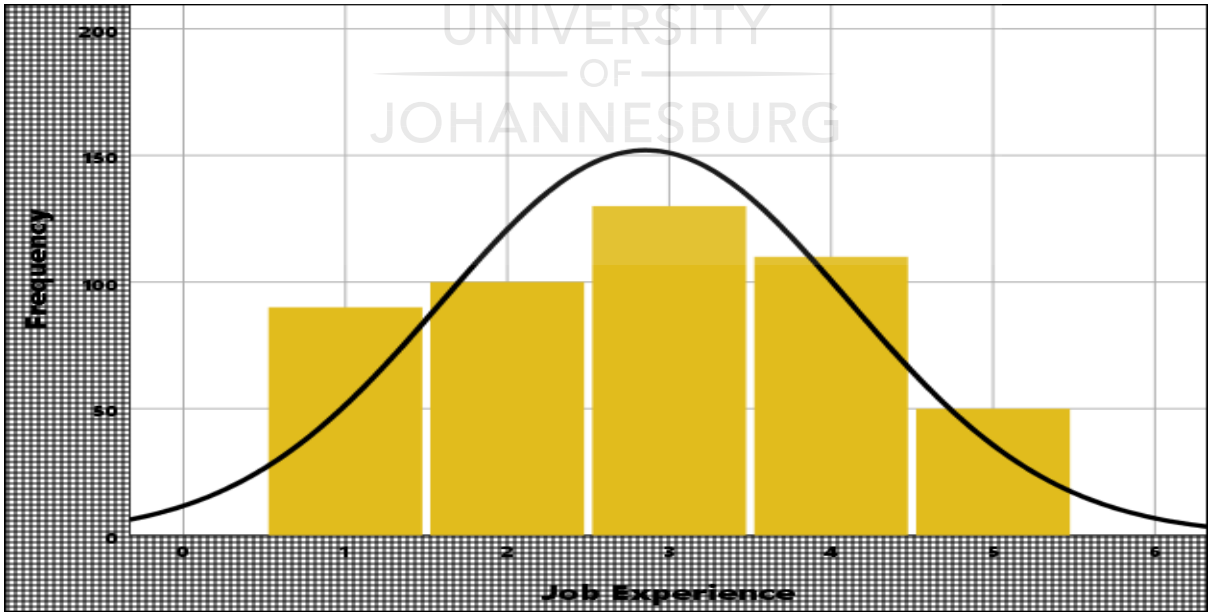


Source: Author's Compilation

Figure 5.21: Pie Chart – Job Experience

Frequency – Histogram – Job Experience

Figure 5.22 below shows that the job experience profile has a normal distribution with a slightly left long tail since the skewness is negative and close to zero. Its observations cluster less because their kurtosis is negative as well.



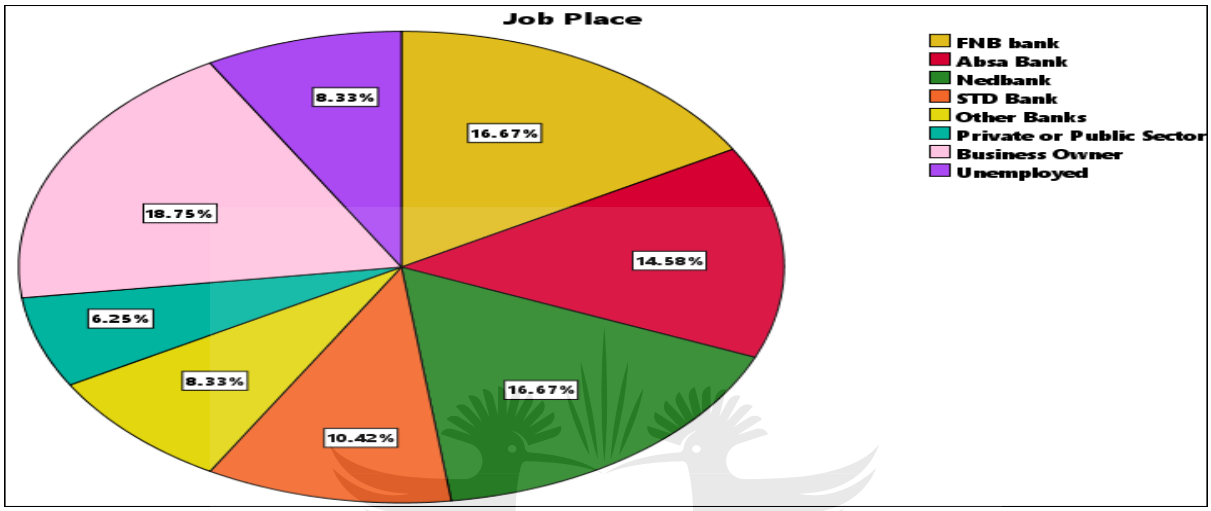
Source: Author's Compilation

Figure 5.22: Histogram Chart – Job Experience

5.3.2.6 Job Place

Frequency - Pie Chart – Job Place

Figure 5.23 below shows that 16.67% of the respondents work at FNB bank, 14.58% at Absa bank, 16.67% at Nedbank, 10.42% at STD bank and 8.33% work at other SA banks while 6.25% work at the private and public sector, 18.75% are business owners and 8.33% are unemployed.

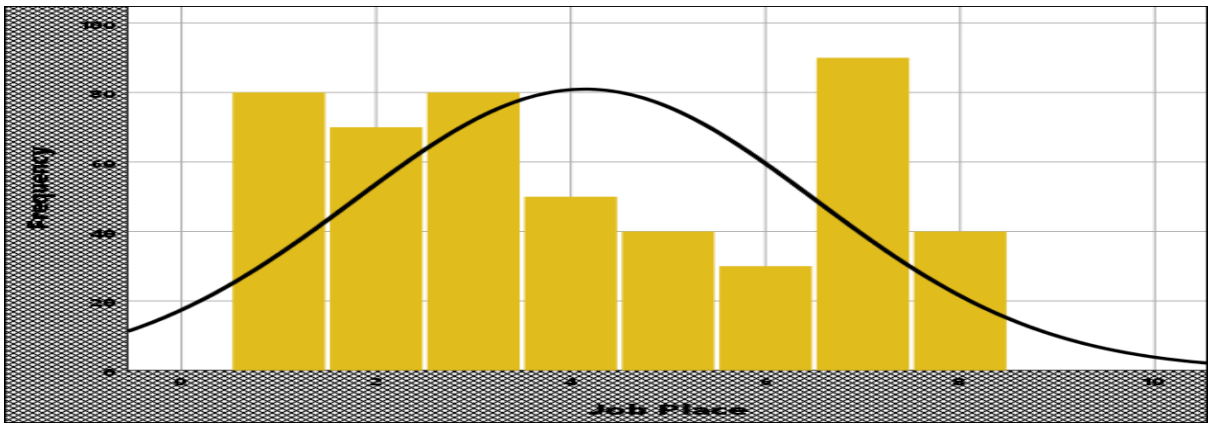


Source: Author's Compilation

Figure 5.23: Pie Chart – Job place

Frequency – Histogram – Job Place

Figure 5.24 below shows that the job place profile has a normal distribution with a right long tail since the skewness is positive and close to zero. Its observations cluster less because their kurtosis is negative as well. Additionally, the graph shows a departure from the symmetry on the right because twice its standard error of skewness is more than the skewness value.



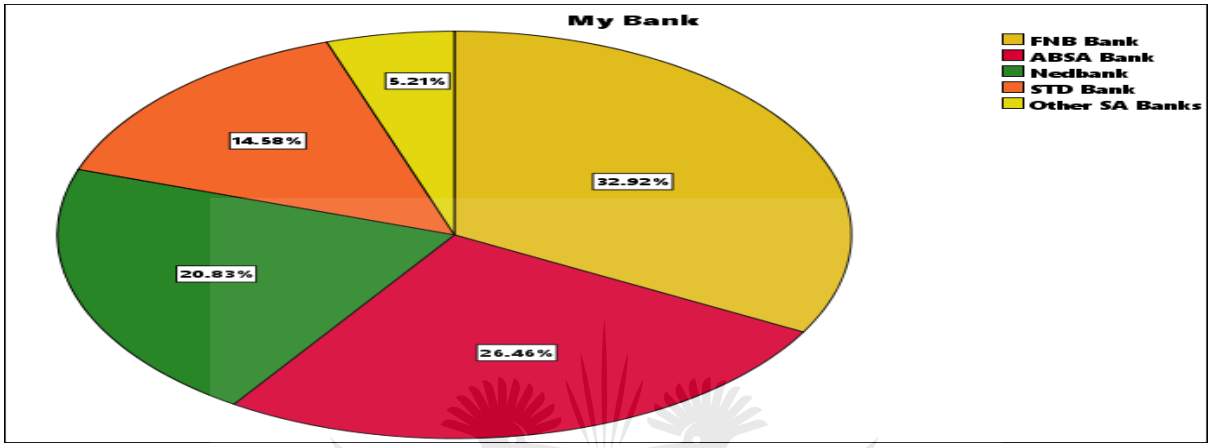
Source: Author's Compilation

Figure 5.24: Histogram Chart – Job place

5.3.2.7 My Bank/SA Banks

Frequency -Pie chart – SA Banks

Figure 5.25 below shows that 32.92% of the respondents have a bank account at FNB bank, 26.46% at Absa bank, 20.83% at Nedbank, 14.58% at STD bank and lastly 5.21% have account at the other SA banks.

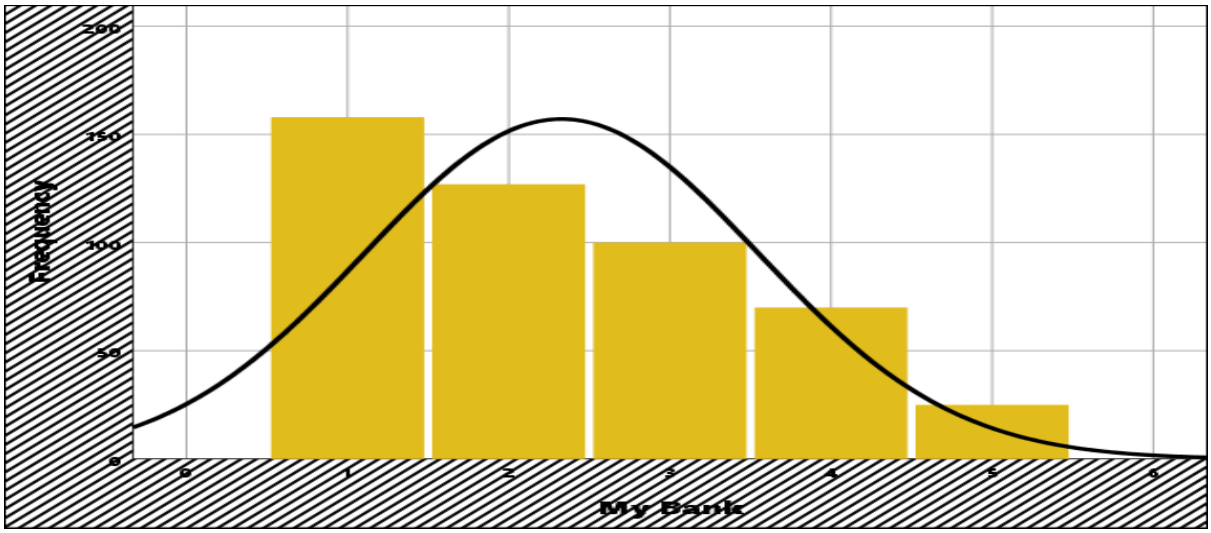


Source: Author's Compilation

Figure 5.25: Pie Chart – My bank/SA banks

Frequency – Histogram – SA Banks

Figure 5.26 below shows that the SA bank profile has a normal distribution with a right long tail since the skewness is positive and close to zero. Its observations cluster less because their kurtosis is negative as well. Additionally, the graph shows a departure from the symmetry because twice its standard error of skewness is more than the skewness value.



Source: Author's Compilation

Figure 5.26: Histogram Chart – My Bank/SA banks

5.3.3 Digitalisation

The digitalisation factor includes business strategies, technological innovation and customer experience that affect digital banking performance in South Africa.

- Digital business strategies (DIGDBS)
- Digital technology Innovation (DIGDTI)
- Digital customer experience (DIGDCE)

Table 5.20 below shows the percentage distribution of the survey items between respondents using the Likert scale questionnaire answers.

Table 5.20: Digitalisation variables

Dependent Variables	**Independent Variables**
Digital business strategies (DIGDBS)	Digital Business Performance (DIGBP)
Digital technology Innovation (DIGDTI)	Digital Business Performance (DIGBP)
Digital customer experience (DIGDCE)	Digital Business Performance (DIGBP)

Source: Author's Compilation

5.3.3.1 Descriptive Statistics

Table 5.21: Descriptive statics- Digitalisation

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Digital Banking Strategies	480	4	1	5	4.11	.032	.708	.501
Digital Technology Innovation	480	2	3	5	4.46	.025	.539	.291
Digital Customer Experience	480	2	3	5	4.10	.036	.798	.636
Digitalisation	480	4.00	1.00	5.00	4.1771	.03203	.70184	.493
Valid N (listwise)	480							

Source: Own Compilation

5.3.3.2 Frequencies

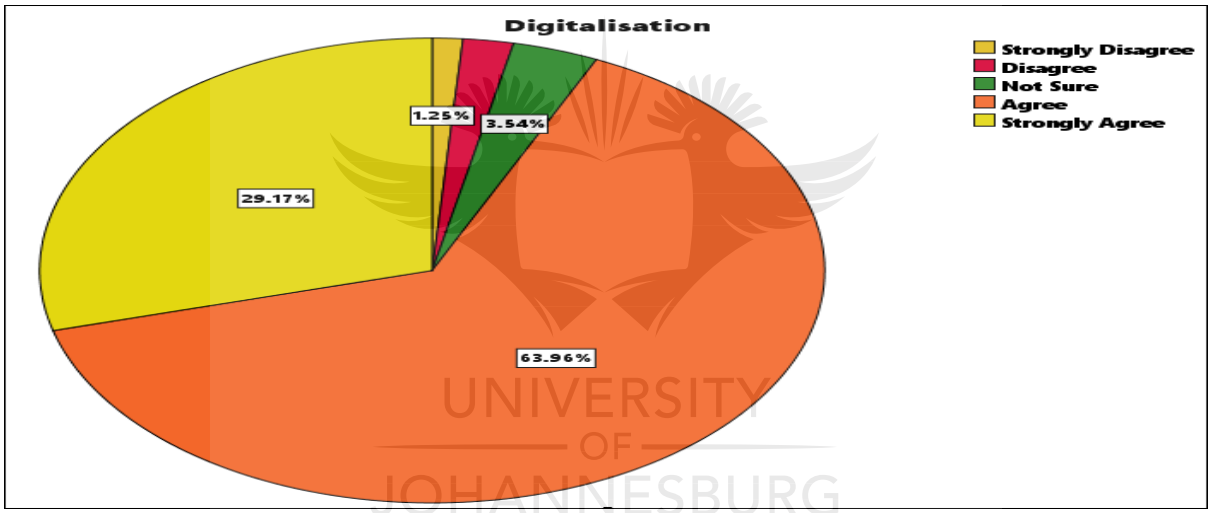
Table 5.22: Frequency of the digitalisation variables

Digitalisation					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	1.3	1.3	1.3
	Disagree	10	2.1	2.1	3.3
	Not Sure	17	3.5	3.5	6.9
	Agree	307	64.0	64.0	70.8
	Strongly Agree	140	29.2	29.2	100.0
	Total	480	100.0	100.0	

Source: Own Compilation

Frequency - Pie Chart - Digitalisation

Figure 5.27 below shows that 93.13% of respondents agreed and strongly agreed that digital business strategies, digital technology innovation and the digital customer experience influence behaviour of the digital banking performance in South Africa.



Source : Own Compilation

Figure 5.27: Pie Chart - Digitalisation

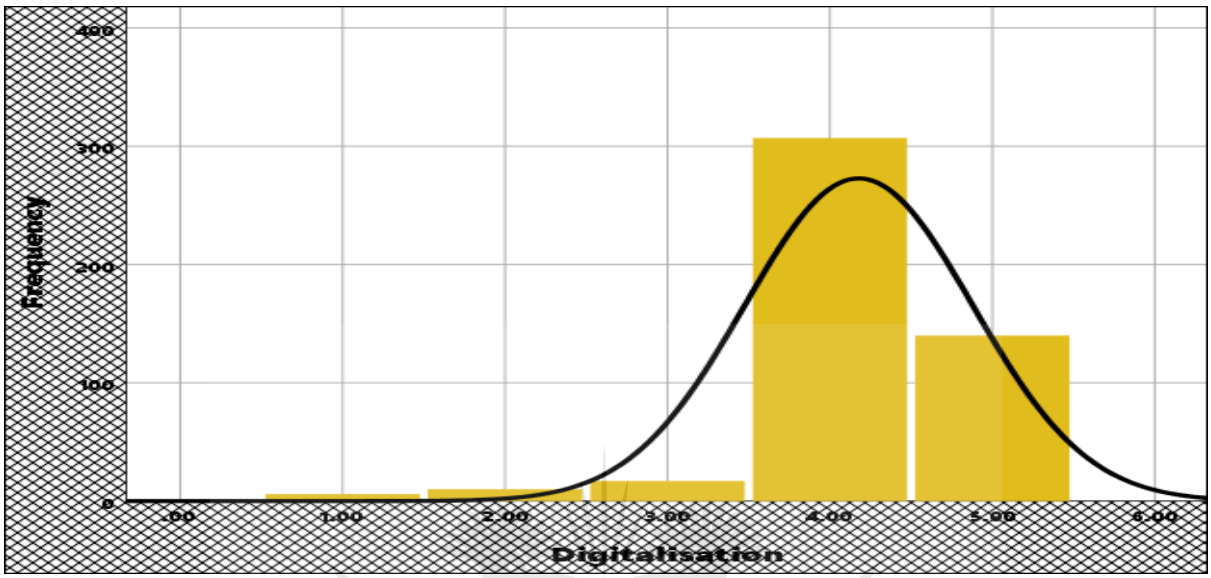
Frequency - Histogram Chart – Digitalisation

Table 5.23: Frequency - Histogram Chart - Digitalisation

Statistics					
		Digital Banking Strategies	Digital Technology Innovation	Digital Customer Experience	Digitalisation
N	Valid	480	480	480	480
	Missing	0	0	0	0
Skewness		-1.902	-.235	-.189	-1.498
Std. Error of Skewness		.111	.111	.111	.111
Kurtosis		7.096	-1.125	-1.405	5.111
Std. Error of Kurtosis		.222	.222	.222	.222

Source: Own Compilation

Figure 5.28 below shows that the digitalisation profile has a normal distribution with a left long tail since the skewness is negative and close to zero. Its observations cluster more because their kurtosis is positive. Additionally, the graph shows no departure from the symmetry because twice its standard error of skewness is less than the skewness value.



Source: Own compilation

Figure 5.28: Frequency- Histogram chart- Digitalisation

5.3.3.3 Correlation Analysis

Table 5.24 below shows that there is a positive relationship between the digitalisation and its variables namely the digital banking strategies, the digital technology innovation and the digital customer experience.

Table 5.24: Correlation analysis – Digitalisation variables

Correlations

		Digital Banking Strategies	Digital Technology Innovation	Digital Customer Experience	Digitalisation
Digital Banking Strategies	Pearson Correlation	1	.636**	.600**	.918**
	Sig. (2-tailed)		.000	.000	.000
	N	480	480	480	480
Digital Technology Innovation	Pearson Correlation	.636**	1	.811**	.701**
	Sig. (2-tailed)	.000		.000	.000
	N	480	480	480	480
Digital Customer Experience	Pearson Correlation	.600**	.811**	1	.694**
	Sig. (2-tailed)	.000	.000		.000
	N	480	480	480	480
Digitalisation	Pearson Correlation	.918**	.701**	.694**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	480	480	480	480

**. Correlation is significant at the 0.01 level (2-tailed).

Source : Own Compilation

5.3.3.4 Regression Analysis

Table 5.25: Regression Analysis – Model Summary - Digitalisation

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.936[a]	.876	.875	.24768

a. Predictors: (Constant), Digital Customer Experience, Digital Banking Strategies, Digital Technology Innovation

Source: Own Compilation

Table 5.26: Regression Analysis – ANOVA - Digitalisation

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	206.748	3	68.916	1123.429	.000[b]
	Residual	29.200	476	.061		
	Total	235.948	479			

a. Dependent Variable: Digitalisation

b. Predictors: (Constant), Digital Customer Experience, Digital Banking Strategies, Digital Technology Innovation

Source: Author's Compilation

5.3.3.4 Digitalisation and South African Banks

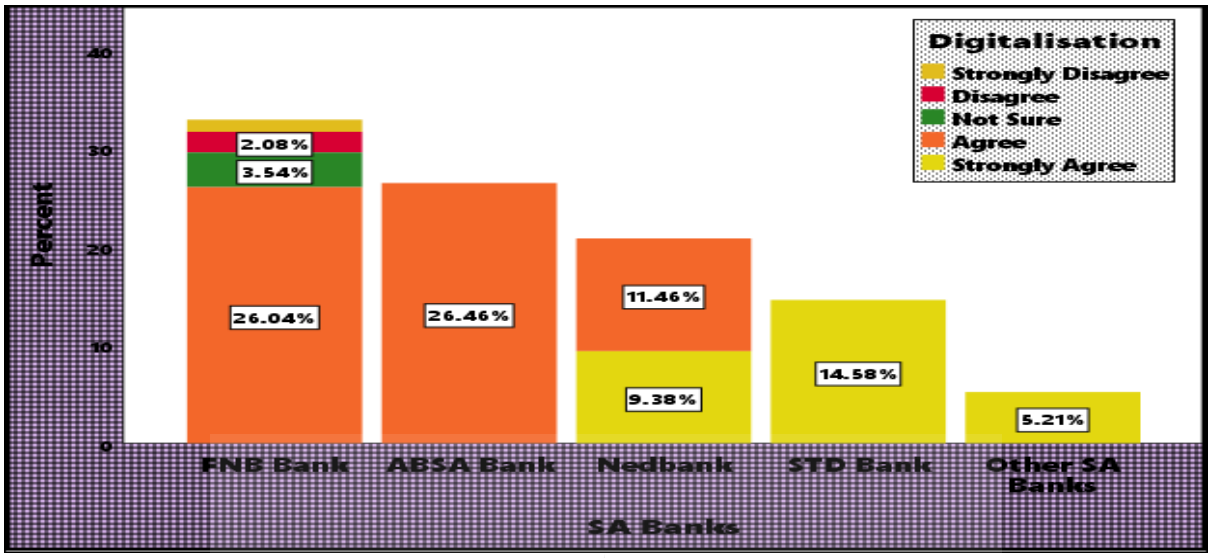
Crosstabs Analysis

Table 5.27: Crosstab Analysis – Digitalisation Vs SA banks

			My Bank					
			FNB Bank	ABSA Bank	Nedbank	STD Bank	Other SA Banks	Total
Digitalisation	Strongly Disagree	Count	6	0	0	0	0	6
		% within Digitalisation	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within My Bank	3.8%	0.0%	0.0%	0.0%	0.0%	1.3%
		% of Total	1.3%	0.0%	0.0%	0.0%	0.0%	1.3%
	Disagree	Count	10	0	0	0	0	10
		% within Digitalisation	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within My Bank	6.3%	0.0%	0.0%	0.0%	0.0%	2.1%
		% of Total	2.1%	0.0%	0.0%	0.0%	0.0%	2.1%
	Not Sure	Count	17	0	0	0	0	17
		% within Digitalisation	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within My Bank	10.8%	0.0%	0.0%	0.0%	0.0%	3.5%
		% of Total	3.5%	0.0%	0.0%	0.0%	0.0%	3.5%
	Agree	Count	125	127	55	0	0	307
		% within Digitalisation	40.7%	41.4%	17.9%	0.0%	0.0%	100.0%
		% within My Bank	79.1%	100.0%	55.0%	0.0%	0.0%	64.0%
		% of Total	26.0%	26.5%	11.5%	0.0%	0.0%	64.0%
	Strongly Agree	Count	0	0	45	70	25	140
		% within Digitalisation	0.0%	0.0%	32.1%	50.0%	17.9%	100.0%
		% within My Bank	0.0%	0.0%	45.0%	100.0%	100.0%	29.2%
		% of Total	0.0%	0.0%	9.4%	14.6%	5.2%	29.2%
Total		Count	158	127	100	70	25	480
		% within Digitalisation	32.9%	26.5%	20.8%	14.6%	5.2%	100.0%
		% within My Bank	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	32.9%	26.5%	20.8%	14.6%	5.2%	100.0%

Source: Own Compilation

Stacked Histogram Percent of Digitalisation by SA Banks



Source: Own Compilation

Figure 5.29: Stacked Histogram Percent of Digitalisation by SA Banks

Digital Banking Strategies (DIGDBS)

Since traditional ways of doings things is given place to the numerical and digital techniques and processes, specific guidelines should govern the transformation. Standard business strategies are upgraded and combined with the digital emerging strategies to optimise banking strategy achievements. Standard business strategies comprise differentiation, market positioning, and market segmentation. Digital banking strategies include customer and product – Centric approach, change-driven leadership and security-driven strategies among others as displayed on table 5.28 below.

Table 5.28: Digital business strategy variables

Dependent Variables	**Independent Variables**
Differentiation	Digital business strategies (DIGDBS)
Market Segmentation and Positioning	Digital business strategies (DIGDBS)
Customer and Product-Centric	Digital business strategies (DIGDBS)
Change-Driven Leadership	Digital business strategies (DIGDBS)
Security-Driven Strategy	Digital business strategies (DIGDBS)
Data-Driven Strategy	Digital business strategies (DIGDBS)

Source: Author's Compilation

Descriptive Statistics

Table 5.29: Descriptive Statistics

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Differentiation	480	4	1	5	4.38	.048	1.044	1.091
Market Segmentation and Positioning	480	4	1	5	4.29	.050	1.086	1.179
Customer and Product-Centric	480	4	1	5	4.28	.050	1.106	1.224
Change-Driven Leadership	480	4	1	5	4.37	.046	1.013	1.026
Security-Driven Strategy	480	4	1	5	4.63	.048	1.044	1.090
Data-Driven Strategy	480	4	1	5	4.62	.045	.996	.993
Digital Banking Strategies	480	4	1	5	4.11	.032	.708	.501
Valid N (listwise)	480							

Source: Author's Compilation

Frequency - Pie Chart - Digital business strategy variables

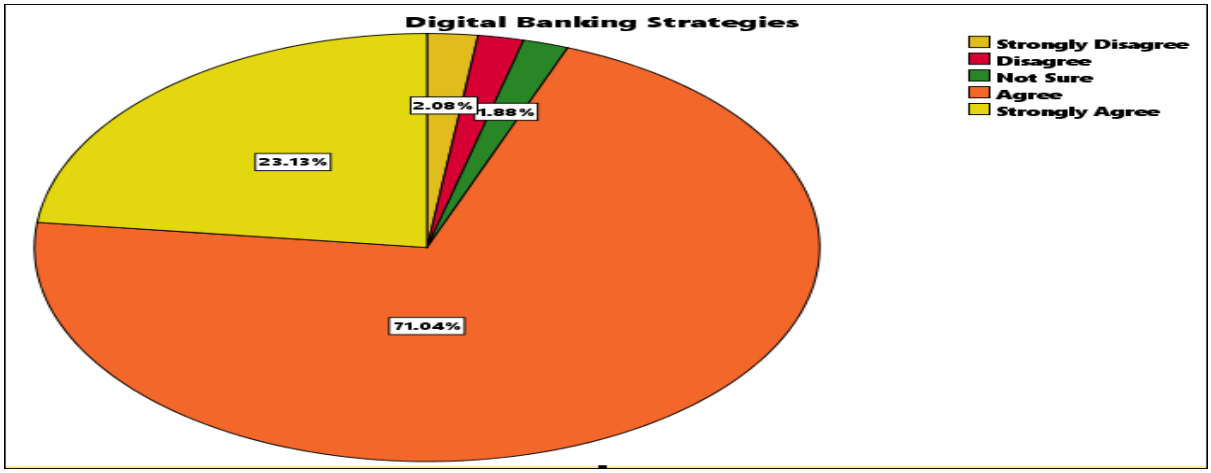
Table 5.30 displays the percentage distribution of survey items between participants using the five Likert scale questionnaire answers. 94.17% of the respondents agreed and strongly agreed that efficient business strategies have a great impact on the digital performance. Digital business strategies contain of both traditional and digital emerging strategies.

Table 5.30: Frequency – Digital Banking Strategies

Digital Banking Strategies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	10	2.1	2.1	2.1
	Disagree	9	1.9	1.9	4.0
	Not Sure	9	1.9	1.9	5.8
	Agree	341	71.0	71.0	76.9
	Strongly Agree	111	23.1	23.1	100.0
	Total	480	100.0	100.0	

Source: Author's Compilation

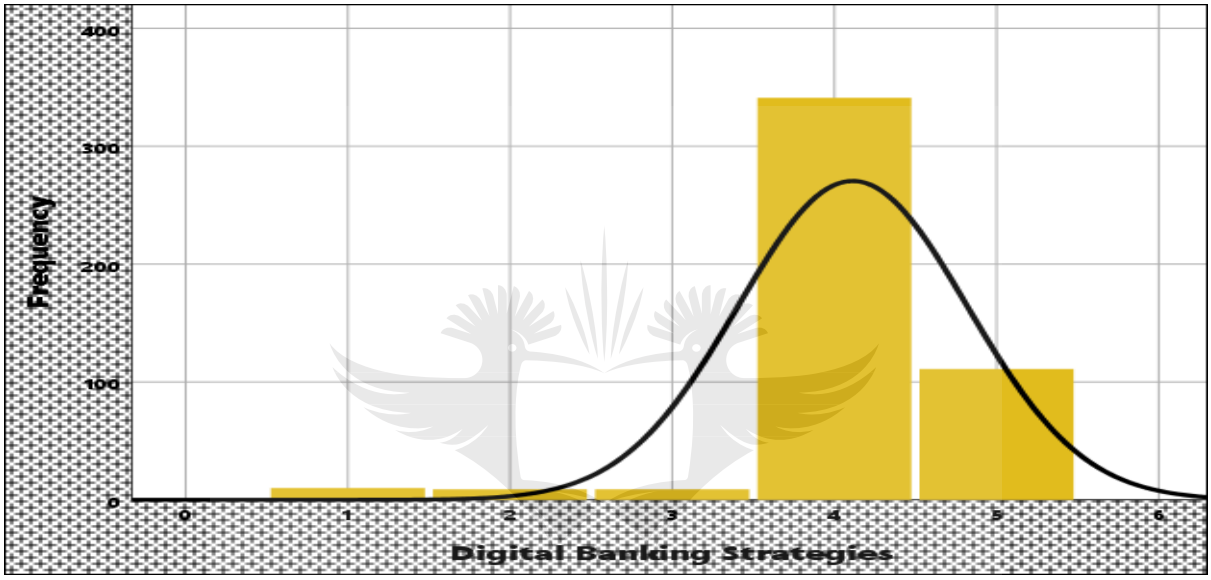


Source: Author's Compilation

Figure 5.30: Frequency - Histogram Chart

Frequency - Histogram Chart - Digital business strategy variables

Figure 5.31 below shows that digital business strategy variable has a normal distribution with a left long tail since the skewness is negative and close to zero. Its observations cluster more because their kurtosis is positive. Additionally, the graph shows no departure from the symmetry because twice its standard error of skewness is less than the skewness value.



Source: Author's Compilation

Figure 5.31: Frequency - Histogram Chart - Digital Banking Strategies

Correlation Analysis

Since the reliability and the validity tests already confirmed appropriateness of the DIGDBS variables, table 46 also below shows that there is a strong relationship between digital banking strategies.

Table 5.31: Correlation Analysis

Correlations

		Differentiation	Market Segmentation and Positioning	Customer and Product-Centric	Change-Driven Leadership	Security-Driven Strategy	Data-Driven Strategy	Digital Banking Strategies
Differentiation	Pearson Correlation	1	.966**	.963**	.979**	.913**	.913**	.725**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000
	N	480	480	480	480	480	480	480
Market Segmentation and Positioning	Pearson Correlation	.966**	1	.995**	.959**	.858**	.881**	.710**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000
	N	480	480	480	480	480	480	480
Customer and Product-Centric	Pearson Correlation	.963**	.995**	1	.967**	.860**	.883**	.699**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000
	N	480	480	480	480	480	480	480
Change-Driven Leadership	Pearson Correlation	.979**	.959**	.967**	1	.891**	.905**	.708**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000
	N	480	480	480	480	480	480	480
Security-Driven Strategy	Pearson Correlation	.913**	.858**	.860**	.891**	1	.980**	.687**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000
	N	480	480	480	480	480	480	480
Data-Driven Strategy	Pearson Correlation	.913**	.881**	.883**	.905**	.980**	1	.686**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000
	N	480	480	480	480	480	480	480
Digital Banking Strategies	Pearson Correlation	.725**	.710**	.699**	.708**	.687**	.686**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	480	480	480	480	480	480	480

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's Compilation

As part of the digitalisation and further the digital banking performance, it is important to find out if the DIGDBS variables are significant among them. Table 5.32 depicts that R square is greater than 50% and table 5.33 asserts a great significance between DIGDBS variables with a Sig. coefficient less than .01.

Regression Analysis

Table 5.32: Regression Analysis – Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.738[a]	.544	.539	.481

a. Predictors: (Constant), Data-Driven Strategy, Market Segmentation and Positioning, Change-Driven Leadership, Security-Driven Strategy, Differentiation, Customer and Product-Centric

Source: Own Compilation

Table 5.33: Regression Analysis - ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	130.607	6	21.768	94.186	.000[b]
	Residual	109.318	473	.231		
	Total	239.925	479			

a. Dependent Variable: Digital Banking Strategies

b. Predictors: (Constant), Data-Driven Strategy, Market Segmentation and Positioning, Change-Driven Leadership, Security-Driven Strategy, Differentiation, Customer and Product-Centric

Source: Author's Compilation

Digital Business Strategies and South African Banks

Crosstabs Analysis

Table 5.34: Crosstabulation analysis

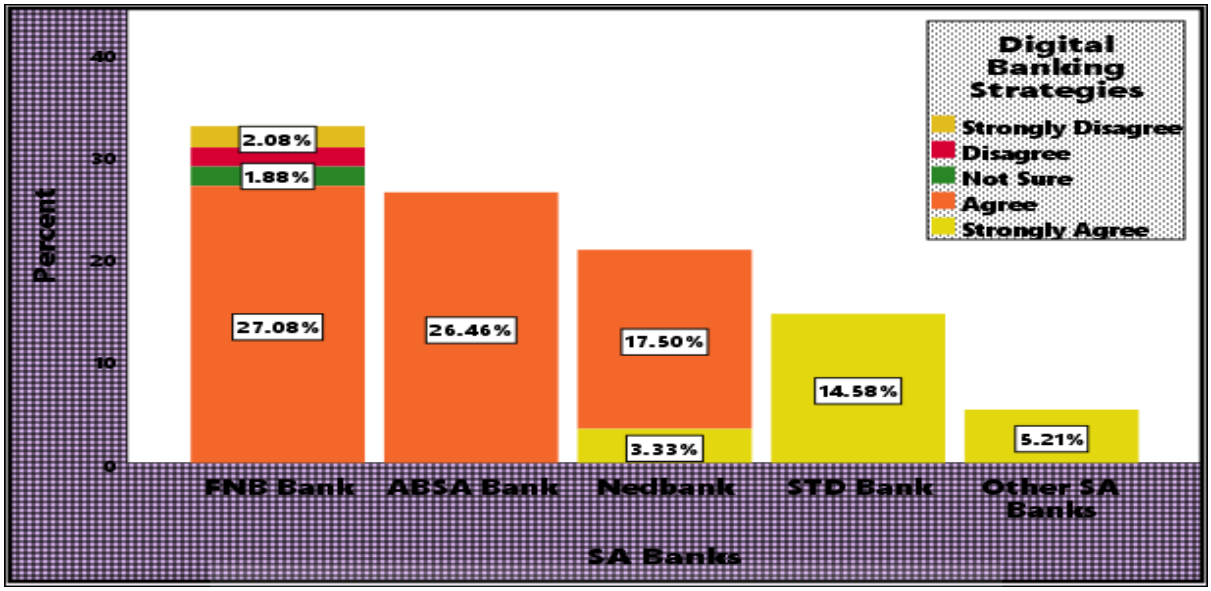
Digital Banking Strategies * My Bank Crosstabulation

			My Bank					
			FNB Bank	ABSA Bank	Nedbank	STD Bank	Other SA Banks	Total
Digital Banking Strategies	Strongly Disagree	Count	10	0	0	0	0	10
		% within Digital Banking Strategies	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within My Bank	6.3%	0.0%	0.0%	0.0%	0.0%	2.1%
		% of Total	2.1%	0.0%	0.0%	0.0%	0.0%	2.1%
	Disagree	Count	9	0	0	0	0	9
		% within Digital Banking Strategies	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within My Bank	5.7%	0.0%	0.0%	0.0%	0.0%	1.9%
		% of Total	1.9%	0.0%	0.0%	0.0%	0.0%	1.9%
	Not Sure	Count	9	0	0	0	0	9
		% within Digital Banking Strategies	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within My Bank	5.7%	0.0%	0.0%	0.0%	0.0%	1.9%
		% of Total	1.9%	0.0%	0.0%	0.0%	0.0%	1.9%
	Agree	Count	130	127	84	0	0	341
		% within Digital Banking Strategies	38.1%	37.2%	24.6%	0.0%	0.0%	100.0%
		% within My Bank	82.3%	100.0%	84.0%	0.0%	0.0%	71.0%
		% of Total	27.1%	26.5%	17.5%	0.0%	0.0%	71.0%
	Strongly Agree	Count	0	0	16	70	25	111
		% within Digital Banking Strategies	0.0%	0.0%	14.4%	63.1%	22.5%	100.0%
		% within My Bank	0.0%	0.0%	16.0%	100.0%	100.0%	23.1%
		% of Total	0.0%	0.0%	3.3%	14.6%	5.2%	23.1%
Total		Count	158	127	100	70	25	480
		% within Digital Banking Strategies	32.9%	26.5%	20.8%	14.6%	5.2%	100.0%
		% within My Bank	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	32.9%	26.5%	20.8%	14.6%	5.2%	100.0%

Source: Own Compilation

Stacked Histogram Percent of Digital Banking Strategies by SA Banks

Figure 5.32 below depicts that 27.1%, 26.5% and 17.5% of respondents who respectively have an FNB, Absa and Nedbank account agree on the importance of defining specific banking strategies all aligned to the digital requirements. Although 5.9% of respondents at FNB bank disgree and are not sure of the impact, 3.3%, 14.6% and 5.2% of participants respectively strongly agree on the neceesity to implement digital banking strategies that include both traditional and emerging strategies.



Source: Own Compilation

Figure 5.32: Stacked Histogram Percent of Digital Banking Strategies by SA Banks

Digital Technology Innovation (DIGDTI)

The 4IR is dominated by digital technology innovations that replace traditional techniques and methods. The digital technology change starts with the use of multiple channels to effectively achieve same results. Since the customers are now experienced, technological innovations must be sound and relevant as to improve customers' life conditions. From the use of smart devices to digital channels, a sophisticated digital system architecture should be built as the IT platform.

Table 5.35: Digital Technology Innovation variables

Dependent Variables	**Independent Variable**
Internet of Things	Digital Technological Innovation (DIGDTI)
Smart Innovations	Digital Technological Innovation (DIGDTI)
Smart Devices	Digital Technological Innovation (DIGDTI)
Data Analytics	Digital Technological Innovation (DIGDTI)
Artificial Intelligence	Digital Technological Innovation (DIGDTI)
Digital Banking Channels	Digital Technological Innovation (DIGDTI)
Banking Security Measures	Digital Technological Innovation (DIGDTI)

Cyber Security Measures	Digital Technological Innovation (DIGDTI)
Cloud Domain Architecture	Digital Technological Innovation (DIGDTI)
Green Innovations	Digital Technological Innovation (DIGDTI)

Source: Author's Compilation

Descriptive Statistics

Table 5.36: Descriptive statistics – Digital technology innovation

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Internet of Things	480	1	4	5	4.40	.022	.490	.240
Smart Innovations	480	1	4	5	4.38	.022	.485	.235
Smart Devices	480	1	4	5	4.58	.023	.494	.244
Data Analytics	480	1	4	5	4.56	.023	.497	.247
Artificial Intelligence	480	1	4	5	4.52	.023	.500	.250
Digital Banking Channels	480	1	4	5	4.48	.023	.500	.250
Banking Security Measures	480	1	4	5	4.54	.023	.499	.249
Cyber Security Measures	480	1	1	2	1.63	.022	.484	.234
Cloud Domain Architecture	480	4	1	5	4.47	.027	.592	.350
Green Innovations	480	1	4	5	4.31	.021	.464	.215
Digital Technology Innovation	480	2	3	5	4.46	.025	.539	.291
Valid N (listwise)	480							

Source: Own compilation

Table 5.37: Frequency – Digital technology innovation

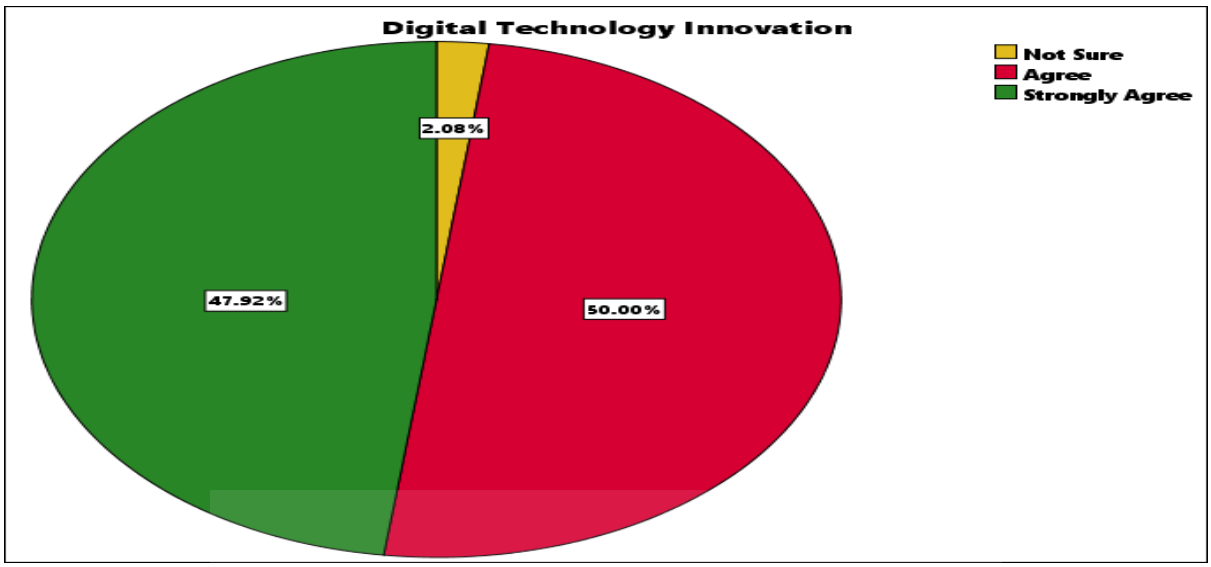
Digital Technology Innovation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Sure	10	2.1	2.1	2.1
	Agree	240	50.0	50.0	52.1
	Strongly Agree	230	47.9	47.9	100.0
	Total	480	100.0	100.0	

Source: Author's Compilation

Figure 5.33 displays the percentage distribution of survey items between participants using the five Likert scale questionnaire answers. 97.9% of the respondents agreed and strongly agreed that efficient digital technology innovations have a great impact on the digital performance.

Frequency - Pie Chart - Digital technology innovation



Source: Author's Compilation

Figure 5.33: Pie Chart – Digital technology innovations

Frequency - Histogram Chart - Digital technology innovation

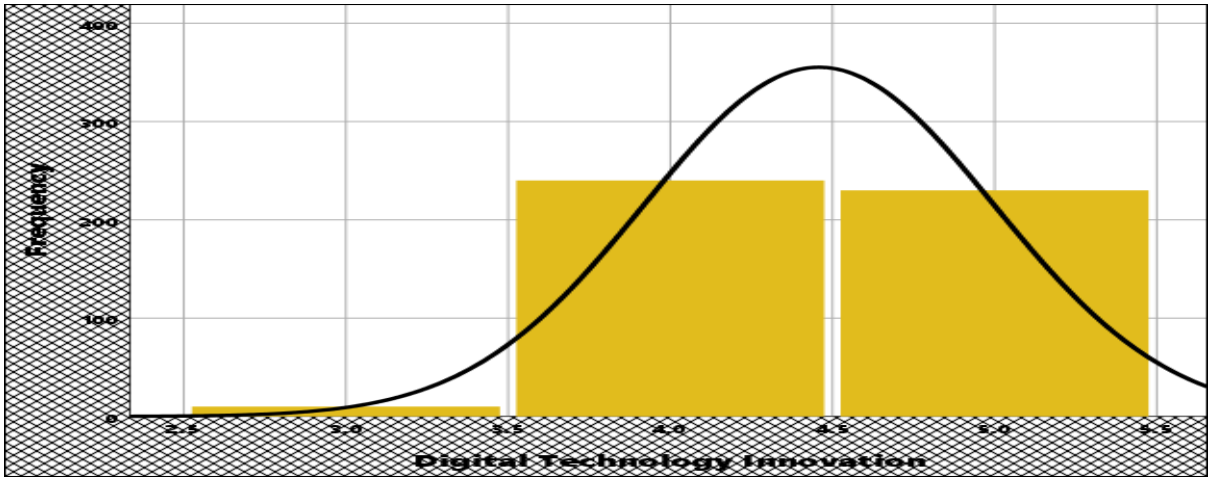
Frequency - Histogram Chart

Table 5.38: Skewness and Kurtosis statistics

Statistics		
Digital Technology Innovation		
N	Valid	480
	Missing	0
Skewness		-.235
Std. Error of Skewness		.111
Kurtosis		-1.125
Std. Error of Kurtosis		.222

Source: Author's Compilation

Table 5.38 and Figure 5.34 below show that digital technology innovation has a normal distribution with a left long tail since the skewness is negative and close to zero. Its observations cluster less because their kurtosis is negative as well. Additionally, the graph shows a proximity to the symmetry because twice its standard error of skewness is less than the skewness value.



Source: Own Compilation

Figure 5.34: Histogram Chart – Digital technology innovations

Correlation Analysis

Since the reliability and the validity tests already confirmed appropriateness of the DIGDTI variables, table 5.39 below also asserts that there is a strong relationship between digital technology innovation variables.

Table 5.39: Correlation Analysis

Correlations

		Internet of Things	Smart Innovations	Smart Devices	Data Analytics	Artificial Intelligence	Digital Banking Channels	Banking Security Measures	Cyber Security Measures	Cloud Domain Architecture	Green Innovations	Digital Technology Innovation
Internet of Things	Pearson Correlation	1	.957**	.684**	.714**	.776**	.844**	.745**	.624**	.722**	.833**	.814**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
Smart Innovations	Pearson Correlation	.957**	1	.655**	.683**	.743**	.808**	.713**	.597**	.691**	.870**	.779**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
Smart Devices	Pearson Correlation	.684**	.655**	1	.958**	.881**	.811**	.919**	.912**	.769**	.570**	.798**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
Data Analytics	Pearson Correlation	.714**	.683**	.958**	1	.919**	.846**	.959**	.874**	.798**	.595**	.829**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
Artificial Intelligence	Pearson Correlation	.776**	.743**	.881**	.919**	1	.920**	.959**	.804**	.859**	.647**	.894**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
Digital Banking Channels	Pearson Correlation	.844**	.808**	.811**	.846**	.920**	1	.882**	.740**	.855**	.703**	.965**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
Banking Security Measures	Pearson Correlation	.745**	.713**	.919**	.959**	.959**	.882**	1	.838**	.828**	.620**	.861**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
Cyber Security Measures	Pearson Correlation	.624**	.597**	.912**	.874**	.804**	.740**	.838**	1	.712**	.520**	.736**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
Cloud Domain Architecture	Pearson Correlation	.722**	.691**	.769**	.798**	.859**	.855**	.828**	.712**	1	.601**	.910**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
Green Innovations	Pearson Correlation	.833**	.870**	.570**	.595**	.647**	.703**	.620**	.520**	.601**	1	.678**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000
	N	480	480	480	480	480	480	480	480	480	480	480
Digital Technology Innovation	Pearson Correlation	.814**	.779**	.798**	.829**	.894**	.965**	.861**	.736**	.910**	.678**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	
	N	480	480	480	480	480	480	480	480	480	480	480

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's Compilation

As part of the digitalisation variables and further the digital banking performance, it is important to find out if the DIGDTI variables are significant among them. Table 5.40 depicts that R square is greater than 50% and table 57 asserts that there is a great significance between DIGDTI variables with a Sig. coefficient less than .01.

Regression Analysis

Table 5.40: Regression Analysis – Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.980[a]	.960	.959	.109

a. Predictors: (Constant), Green Innovations, Cyber Security Measures, Cloud Domain Architecture, Internet of Things, Banking Security Measures, Digital Banking Channels, Smart Devices, Smart Innovations, Artificial Intelligence, Data Analytics

Source: Author's Compilation

Table 5.41: Regression Analysis – ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	133.582	10	13.358	1121.923	.000[b]
	Residual	5.584	469	.012		
	Total	139.167	479			

a. Dependent Variable: Digital Technology Innovation

b. Predictors: (Constant), Green Innovations, Cyber Security Measures, Cloud Domain Architecture, Internet of Things, Banking Security Measures, Digital Banking Channels, Smart Devices, Smart Innovations, Artificial Intelligence, Data Analytics

Source: Author's Compilation

Digital Technology Innovation Vs South African Banks

Crosstabs Analysis

The functionality of the crosstabs allows to measure and evaluate the degree of correspondence between variables at many levels as detailed on table 5.42 below.

Table 5.42: Crosstab Analysis

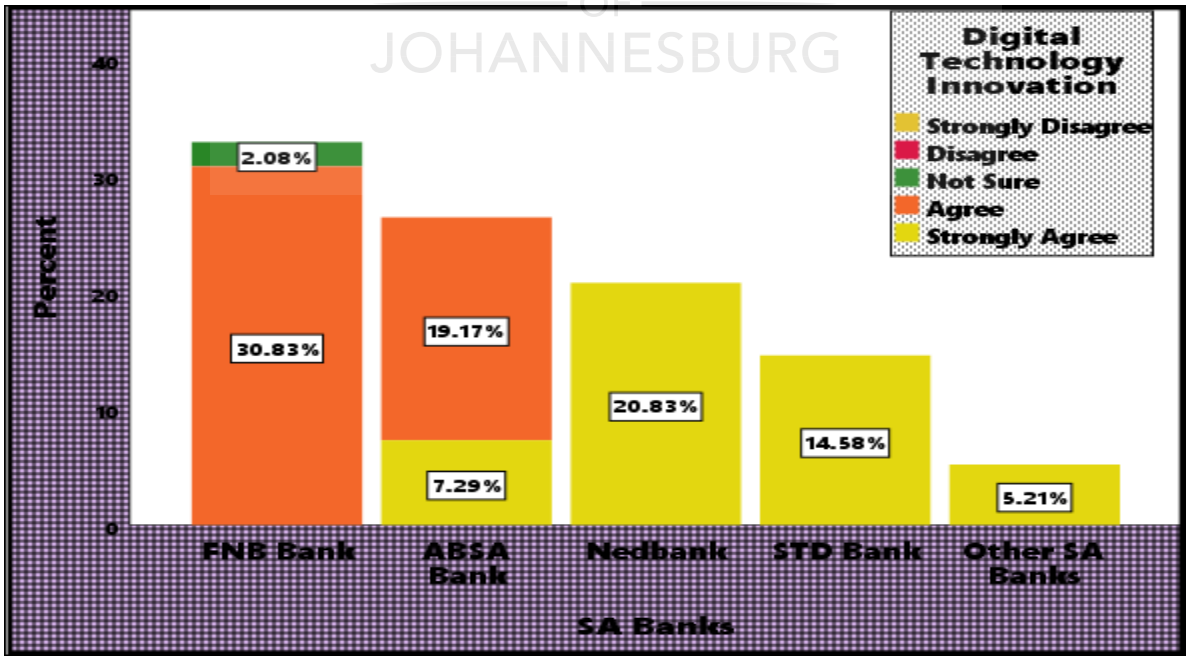
Digital Technology Innovation * My Bank Crosstabulation

			My Bank					
			FNB Bank	ABSA Bank	Nedbank	STD Bank	Other SA Banks	Total
Digital Technology Innovation	Not Sure	Count	10	0	0	0	0	10
		% within Digital Technology Innovation	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within My Bank	6.3%	0.0%	0.0%	0.0%	0.0%	2.1%
		% of Total	2.1%	0.0%	0.0%	0.0%	0.0%	2.1%
	Agree	Count	148	92	0	0	0	240
		% within Digital Technology Innovation	61.7%	38.3%	0.0%	0.0%	0.0%	100.0%
		% within My Bank	93.7%	72.4%	0.0%	0.0%	0.0%	50.0%
		% of Total	30.8%	19.2%	0.0%	0.0%	0.0%	50.0%
	Strongly Agree	Count	0	35	100	70	25	230
		% within Digital Technology Innovation	0.0%	15.2%	43.5%	30.4%	10.9%	100.0%
		% within My Bank	0.0%	27.6%	100.0%	100.0%	100.0%	47.9%
		% of Total	0.0%	7.3%	20.8%	14.6%	5.2%	47.9%
Total		Count	158	127	100	70	25	480
		% within Digital Technology Innovation	32.9%	26.5%	20.8%	14.6%	5.2%	100.0%
		% within My Bank	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	32.9%	26.5%	20.8%	14.6%	5.2%	100.0%

Source: Author's Compilation

Stacked Histogram Percent of Digital Technology Innovations by SA Banks

Figure 5.35 below depicts that 30.83% and 19.17% of respondents who respectively have an FNB and Absa account agree on the importance of defining specific digital technology innovations all aligned to the digital requirements. Although 2.08% of respondents at FNB bank are not sure of the impact, 7.29%, 20.83%, 14.58% and 5.21% of participants respectively from Absa, Nedbank, STD ban and other SA banks strongly agree on the neceesity to implement digital technology innovations.



Source: Author's Compilation

Figure 5.35: Stacked Histogram Percent of Digital Technology Innovations by SA Banks

Digital Customer Experience (DIGDCE)

The digitalisation phenomenon mostly impacts life of the end-users at corporate, organisations and administrations around the world. Everyone must accommodate and adapt to the digital disruption for survival purposes. The survey seeks to identify factors that can improve customer experience and thus release resistance to the digital accomplishment. Table 5.43 below displays Digital customer experience variables.

Table 5.43: Digital customer experience variables

Dependent Variables	**Independent Variable**
Banking and Communication Channels	Digital Customer Experience (DIGDCE)
Manage Demanding Customers	Digital Customer Experience (DIGDCE)
Customer Education and Upgrade	Digital Customer Experience (DIGDCE)
Digital Transformation Support	Digital Customer Experience (DIGDCE)

Source: Author's Compilation

Descriptive Statistics

Table 5.44: Descriptive Statistics – Digital customer experience

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Banking and Communication Channels	480	2	3	5	4.49	.027	.596	.355
Manage Demanding Customers	480	2	3	5	4.41	.028	.606	.367
Customer Education and Upgrade	480	2	3	5	4.32	.027	.587	.344
Digital Transformation Support	480	2	3	5	4.10	.030	.654	.428
Digital Customer Experience	480	2	3	5	4.10	.036	.798	.636
Valid N (listwise)	480							

Source: Own Compilation

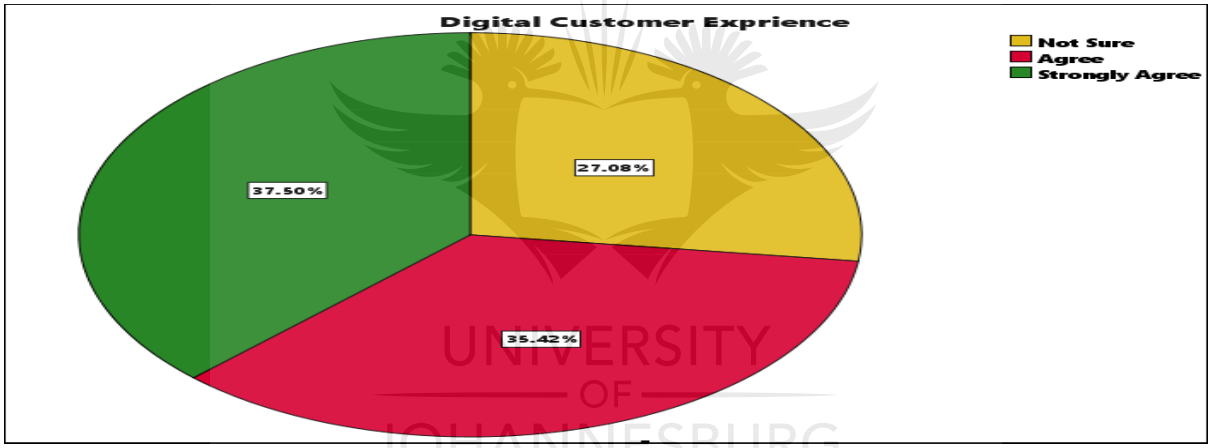
Frequency - Pie Chart – Digital customer experience

Table 5.45: Frequency-Digital customer experience

Digital Customer Experience					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Sure	130	27.1	27.1	27.1
	Agree	170	35.4	35.4	62.5
	Strongly Agree	180	37.5	37.5	100.0
	Total	480	100.0	100.0	

Source: Author's Compilation

Figure 5.36 displays the percentage distribution of survey items between participants using the five Likert scale questionnaire answers. 72.92% of the respondents agreed and strongly agreed that efficient implementation of digital customer experience have a great impact on the digital performance. Although 27.08% are not sure, observations tell us about digital natives that know what they want.



Source: Author's Compilation

Figure 5.36: Pie Chart – Digital Customer Experience

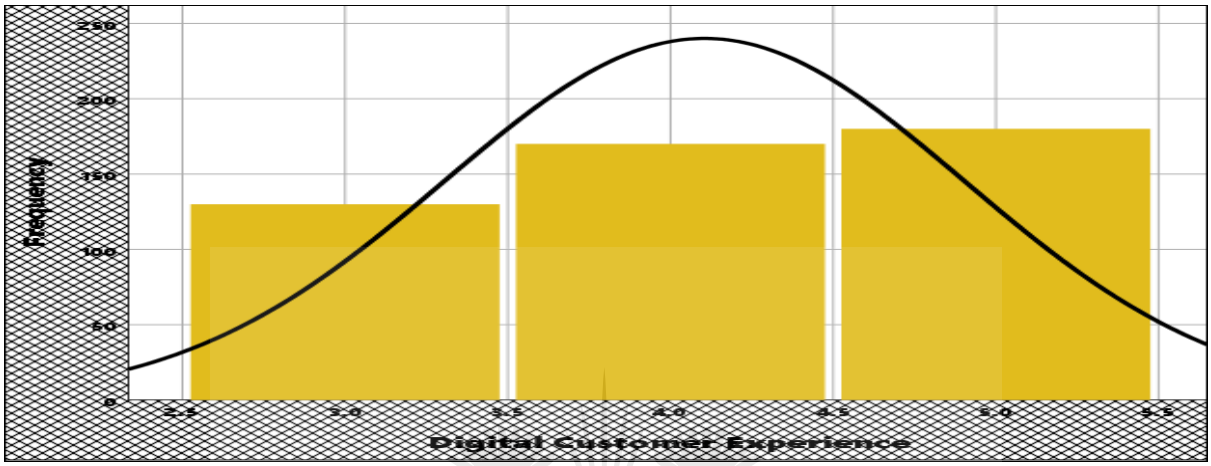
Frequency - Histogram Chart – Digital customer experience

Table 5.46: Skewness and Kurtosis Statistics

Statistics		
Digital Customer Experience		
N	Valid	480
	Missing	0
Skewness		-.189
Std. Error of Skewness		.111
Kurtosis		-1.405
Std. Error of Kurtosis		.222

Source: Author's Compilation

Figure 5.37 below shows that digital customer experience has a normal distribution with a slightly long left tail since the skewness is negative and close to zero. Its observations cluster less because their kurtosis is negative as well. Additionally, the graph shows a proximity to the symmetry because twice its standard error of skewness is less than the skewness value.



Source: Author's Compilation

Figure 5.37: Histogram Chart – Digital Customer Experience

Correlation Analysis

Since the reliability and the validity tests already confirmed appropriateness of the DIGDCE variables, table 5.47 also below shows that there is a strong relationship between digital Customer Experience variables.

Table 5.47: Correlation Analysis- Customer experience

Correlations

		Banking and Communication Channels	Manage Demanding Customers	Customer Education and Upgrade	Digital Transformation Support	Digital Customer Experience
Banking and Communication Channels	Pearson Correlation	1	.894**	.801**	.700**	.793**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	480	480	480	480	480
Manage Demanding Customers	Pearson Correlation	.894**	1	.893**	.736**	.820**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	480	480	480	480	480
Customer Education and Upgrade	Pearson Correlation	.801**	.893**	1	.783**	.865**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	480	480	480	480	480
Digital Transformation Support	Pearson Correlation	.700**	.736**	.783**	1	.820**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	480	480	480	480	480
Digital Customer Experience	Pearson Correlation	.793**	.820**	.865**	.820**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	480	480	480	480	480

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's Compilation

Regression Analysis

As part of the digitalisation variables and further the digital banking performance, it is important to find out if the DIGDCE variables are significant among them. Table 64 depicts that R square is.816 which is greater than 50% and table 5.48 asserts that there is a great significance between DIGDCE variables with a Sig. coefficient less than .01.

Table 5.48: Regression Analysis – Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.903[a]	.816	.815	.343

a. Predictors: (Constant), Digital Transformation Support, Banking and Communication Channels, Customer Education and Upgrade, Manage Demanding Customers

Source: Author's Compilation

Table 5.49: Regression Analysis – ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	248.757	4	62.189	527.172	.000[b]
	Residual	56.035	475	.118		
	Total	304.792	479			

a. Dependent Variable: Digital Customer Experience

b. Predictors: (Constant), Digital Transformation Support, Banking and Communication Channels, Customer Education and Upgrade, Manage Demanding Customers

Source: Author's Compilation

Digital Customer Experience Vs SA Banks

Crosstabs Analysis

The functionality of the crosstabs allows to measure and evaluate the degree of correspondence between Digital Customer Experience variables at many levels as detailed on table 5.50 below.

Table 5.50: Crosstab Analysis - Digital Customer Experience

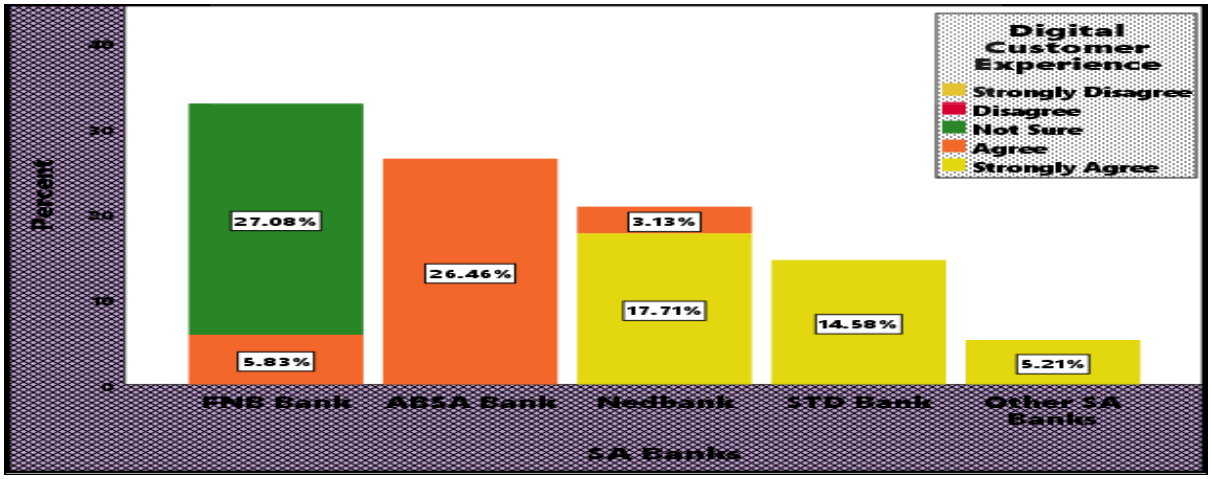
Digital Customer Experience * My Bank Crosstabulation

			My Bank					
			FNB Bank	ABSA Bank	Nedbank	STD Bank	Other SA Banks	Total
Digital Customer Experience	Not Sure	Count	130	0	0	0	0	130
		% within Digital Customer Experience	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within My Bank	82.3%	0.0%	0.0%	0.0%	0.0%	27.1%
		% of Total	27.1%	0.0%	0.0%	0.0%	0.0%	27.1%
	Agree	Count	28	127	15	0	0	170
		% within Digital Customer Experience	16.5%	74.7%	8.8%	0.0%	0.0%	100.0%
		% within My Bank	17.7%	100.0%	15.0%	0.0%	0.0%	35.4%
		% of Total	5.8%	26.5%	3.1%	0.0%	0.0%	35.4%
	Strongly Agree	Count	0	0	85	70	25	180
		% within Digital Customer Experience	0.0%	0.0%	47.2%	38.9%	13.9%	100.0%
		% within My Bank	0.0%	0.0%	85.0%	100.0%	100.0%	37.5%
		% of Total	0.0%	0.0%	17.7%	14.6%	5.2%	37.5%
Total		Count	158	127	100	70	25	480
		% within Digital Customer Experience	32.9%	26.5%	20.8%	14.6%	5.2%	100.0%
		% within My Bank	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	32.9%	26.5%	20.8%	14.6%	5.2%	100.0%

Source: Author's Compilation

Stacked Histogram Percent of Digital Customer Experience by SA Banks

Figure 5.38 below depicts that 5.83%, 26.46% and 3.13% of respondents who respectively have an FNB, Absa and Nedbank account agreed on the importance of implementing digital customer experience all aligned to the digital requirements. Although 27.08% of respondents at FNB bank are not sure of the impact, 17.71%, 14.58% and 5.21% of respondents who respectively have an Nedbank, STD bank and other SA banks account strongly agreed as well.



Source: Author's Compilation

Figure 5.38: Stacked Histogram Percent of Digital Customer Experience by SA Banks

5.3.4 Digital Banking Process Reengineering (DBPRBP)

Table 5.51 below displays variables that can explain the behaviour of the Digital Banking Process Reengineering (DBPRBP).

Table 5.51: Digital BPR variables

Dependent Variables	**Independent Variable**
Banking Omni-Channels	Digital Banking Process Reengineering (DBPRBP)
Process Change Management	Digital Banking Process Reengineering (DBPRBP)
Payment Terminals/Businesses	Digital Banking Process Reengineering (DBPRBP)

Source: Own Compilation

Descriptive Statistics

Table 5.52: Descriptive Statistics – Digital BPR

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Banking Omni-Channels	480	1	4	5	4.62	.022	.485	.235
Process Change Management	480	2	3	5	4.11	.030	.660	.436
Payment Terminals/Businesses	480	1	4	5	4.27	.020	.445	.198
Digital BPR	480	2	3	5	4.03	.031	.669	.448
Valid N (listwise)	480							

Source: Author's Compilation

Frequency - Pie Chart – Digital BPR

Table 5.53: Frequency –Digital BPR

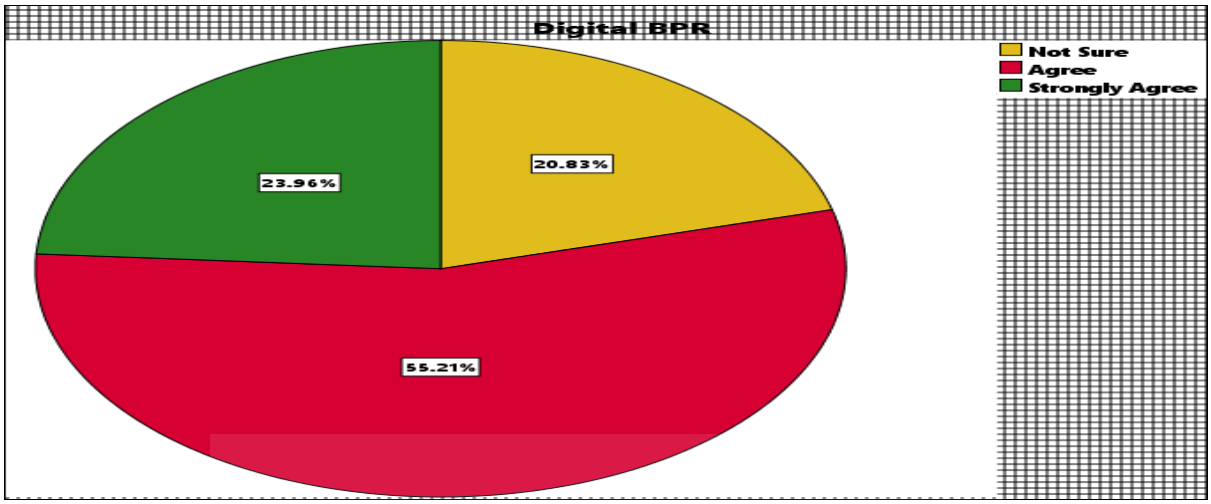
Digital BPR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Sure	100	20.8	20.8	20.8
	Agree	265	55.2	55.2	76.0
	Strongly Agree	115	24.0	24.0	100.0
	Total	480	100.0	100.0	

Source: Author's Compilation

Figure 5.39 displays the percentage distribution of survey items between participants using the five Likert scale questionnaire answers. 79.17% of the respondents agreed and strongly agreed

that efficient Digital Banking Process Reengineering has a great impact on the digital performance.



Source: Author's Compilation

Figure 5.39: Pie Chart – Digital Banking Process Reengineering

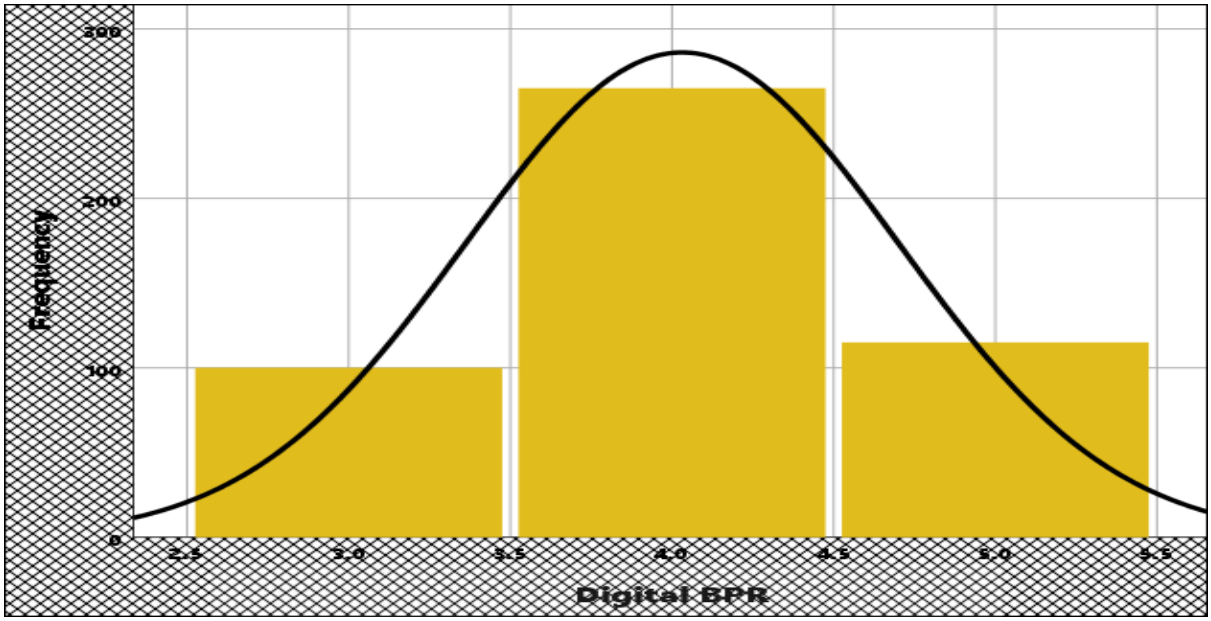
Frequency - Histogram Chart – Digital BPR

Table 5.54: Skewness and Kurtosis Statistics

Statistics		
Digital BPR		
N	Valid	480
	Missing	0
Skewness		-.036
Std. Error of Skewness		.111
Kurtosis		-.760
Std. Error of Kurtosis		.222

Source: Author's Compilation

Figure 5.40 below shows that Digital Banking Process Reengineering has a normal distribution with a tail slightly directing to the left tail since the skewness is negative and close to zero. Its observations cluster less because their kurtosis is negative as well. Additionally, the graph shows a slight departure from the symmetry because twice its standard error of skewness is more than the skewness value.



Source: Author's Compilation

Figure 5.40: Histogram Chart – Digital BPR

Correlation Analysis

Since the reliability and the validity tests already confirmed appropriateness of the DBPRBP variables, table 5.55 also below shows that there is a strong relationship between Digital Banking Process Reengineering variables with coefficient more than .50.

Table 5.55: Correlation Analysis

Correlations

		Banking Omni-Channels	Process Change Management	Payment Terminals/Businesses	Digital BPR
Banking Omni-Channels	Pearson Correlation	1	.657**	.472**	.680**
	Sig. (2-tailed)		.000	.000	.000
	N	480	480	480	480
Process Change Management	Pearson Correlation	.657**	1	.818**	.913**
	Sig. (2-tailed)	.000		.000	.000
	N	480	480	480	480
Payment Terminals/Businesses	Pearson Correlation	.472**	.818**	1	.778**
	Sig. (2-tailed)	.000	.000		.000
	N	480	480	480	480
Digital BPR	Pearson Correlation	.680**	.913**	.778**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	480	480	480	480

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's Compilation

Regression Analysis

As part of the digitalisation variables and further the digital banking performance, it is important to find out if the DBPR variables are significant among them. Table 5.56 depicts that R square is .851 which is greater than 50% and table 5.57 asserts that there is a great significance between DBPR variables with a Sig. coefficient less than .01.

Table 5.56: Regression Analysis – Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.922[a]	.851	.850	.260

a. Predictors: (Constant), Payment Terminals/Businesses, Banking Omni-Channels, Process Change Management

Source: Author's Compilation

Table 5.57: Regression Analysis – ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	182.462	3	60.821	902.750	.000[b]
	Residual	32.069	476	.067		
	Total	214.531	479			

a. Dependent Variable: Digital BPR

b. Predictors: (Constant), Payment Terminals/Businesses, Banking Omni-Channels, Process Change Management

Source: Author's Compilation

Digital Banking Process Reengineering Vs South African Banks

Crosstabs Analysis

The functionality of the crosstabs allows to measure and evaluate the degree of correspondence between Digital Banking Process Reengineering variables at each SA bank levels as detailed on table 5.58 below.

Table 5.58: Stacked Histogram Percent of Digital BPR by SA Banks

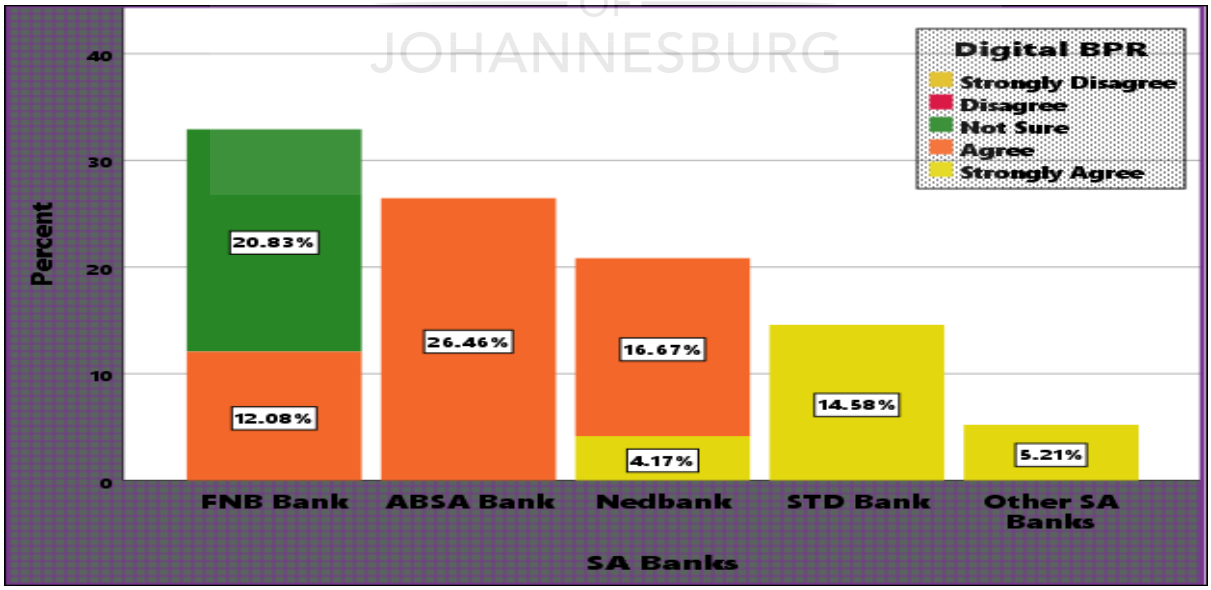
Digital BPR * My Bank Crosstabulation

			My Bank					
			FNB Bank	ABSA Bank	Nedbank	STD Bank	Other SA Banks	Total
Digital BPR	Not Sure	Count	100	0	0	0	0	100
		% within Digital BPR	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within My Bank	63.3%	0.0%	0.0%	0.0%	0.0%	20.8%
		% of Total	20.8%	0.0%	0.0%	0.0%	0.0%	20.8%
	Agree	Count	58	127	80	0	0	265
		% within Digital BPR	21.9%	47.9%	30.2%	0.0%	0.0%	100.0%
		% within My Bank	36.7%	100.0%	80.0%	0.0%	0.0%	55.2%
		% of Total	12.1%	26.5%	16.7%	0.0%	0.0%	55.2%
	Strongly Agree	Count	0	0	20	70	25	115
		% within Digital BPR	0.0%	0.0%	17.4%	60.9%	21.7%	100.0%
		% within My Bank	0.0%	0.0%	20.0%	100.0%	100.0%	24.0%
		% of Total	0.0%	0.0%	4.2%	14.6%	5.2%	24.0%
Total		Count	158	127	100	70	25	480
		% within Digital BPR	32.9%	26.5%	20.8%	14.6%	5.2%	100.0%
		% within My Bank	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	32.9%	26.5%	20.8%	14.6%	5.2%	100.0%

Source: Author's Compilation

Stacked Histogram Percentage of Digital BPR by SA Banks

Figure 5.41 below depicts that 12.08%, 26.46% and 16.67% of respondents who respectively have an FNB, Absa and Nedbank account agree on the importance of reengineering specific Digital banking process all aligned to the digital requirements. Although 20.83% of respondents at FNB bank are not sure of the impact, 4.17%, 14.58% and 5.21% of participants respectively from Nedbank, STD bank and other SA banks strongly agree on the neceesity to implement relevant digital BPR.



Source: Own Compilation

Figure 5.41: Stacked Histogram Percentage of Digital BPR by SA Banks

5.3.5 Digital Banking Conceptual Framework (DCFBP)

Effective Business management at corporate and organisation levels as well as at the financial institutions level requires policy framework that guide business implementation. The advent of the digitalisation and the 4IR have changed business structuration at all functional units. This implies that business management framework must be digitalised and restructured. Since people are aware and actually implement framework at their different workplace, the study run a survey about putting in place a digital conceptual framework aligned to the performance management of financial institutions in South Africa. The study seeks to know if a digital framework can incorporate both standard business practices and digital emerging concepts. Table 5.59 list dependent variables that constitute components of the DCFBP as the independent variable.

Table 5.59: Digital Banking Conceptual Framework variables

Dependent Variables	**Independent Variable**
DBS-DTI-DCE	Digital Banking Conceptual Framework (DBCFBP)
Digital BPR	Digital Banking Conceptual Framework (DBCFBP)
IT Project Management	Digital Banking Conceptual Framework (DBCFBP)
SoS Reengineering/Integration	Digital Banking Conceptual Framework (DBCFBP)
KBM & Emotional Intelligence	Digital Banking Conceptual Framework (DBCFBP)
Employee & Stakeholders' Development	Digital Banking Conceptual Framework (DBCFBP)
Compliance-Laws-Regulations-Acts	Digital Banking Conceptual Framework (DBCFBP)
Compliance-Socioeconomic and Environmental Requirements	Digital Banking Conceptual Framework (DBCFBP)
Compliance-Global and Sustainable Development Requirements	Digital Banking Conceptual Framework (DBCFBP)
Digital Challenge Management	Digital Banking Conceptual Framework (DBCFBP)

Source: Own Compilation

Descriptive Statistics

Table 5.60: Descriptive Statistics

Descriptive Statistics								
	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
DBS-DTI-DCE	480	3	2	5	4.27	.048	1.047	1.096
Digital BPR	480	4	1	5	4.31	.042	.917	.842
IT Project Management	480	4	1	5	4.17	.049	1.068	1.141
SoS Reengineering/Integration	480	4	1	5	4.02	.045	.980	.960
KBM & Emotional Intelligence	480	2	3	5	4.30	.028	.615	.378
Employee & Stakeholders'Development	480	3	2	5	4.23	.033	.715	.511
Compliance-Laws-Regulations-Acts	480	3	2	5	4.20	.034	.745	.556
Compliance-Socioeconomic and Environmental Requirements	480	3	2	5	3.91	.043	.948	.899
Compliance-Global and Sustainable Development Requirements	480	4	1	5	3.84	.040	.869	.756
Digital Challenge Management	480	4	1	5	3.80	.044	.969	.939
Digital Conceptual Framework	480	4	1	5	3.59	.054	1.179	1.390
Valid N (listwise)	480							

Source: Author's Compilation

Frequency - Pie Chart

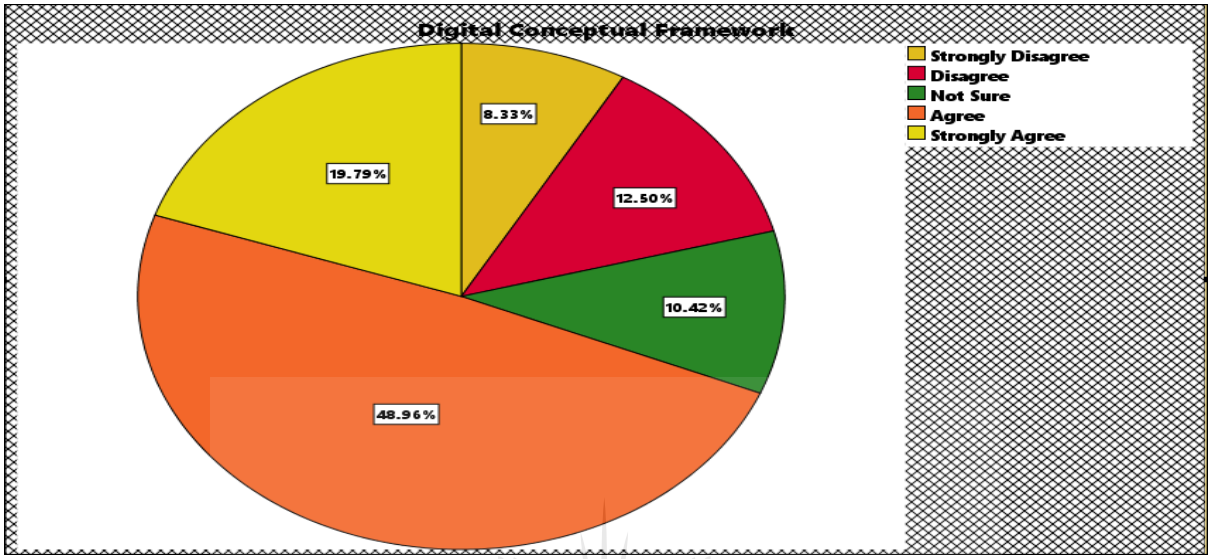
Table 5.61: Frequency-Digital conceptual framework

Digital Conceptual Framework					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	40	8.3	8.3	8.3
	Disagree	60	12.5	12.5	20.8
	Not Sure	50	10.4	10.4	31.3
	Agree	235	49.0	49.0	80.2
	Strongly Agree	95	19.8	19.8	100.0
	Total	480	100.0	100.0	

Source: Author's Compilation

Table 5.61 and figure 5.42 display the percentage distribution of survey items between participants using the five Likert scale questionnaire answers. 68.75% of the respondents agreed and strongly agreed that the existence of a standard digital conceptual framework has a

great impact on the digital performance management. In addition to the people who responded with the “Not sure” answer, respondents who disagreed were not that sure of the meaning of the digital framework and never came across it before.



Source: Author’s Compilation

Figure 5.42: Pie Chart – Digital conceptual framework

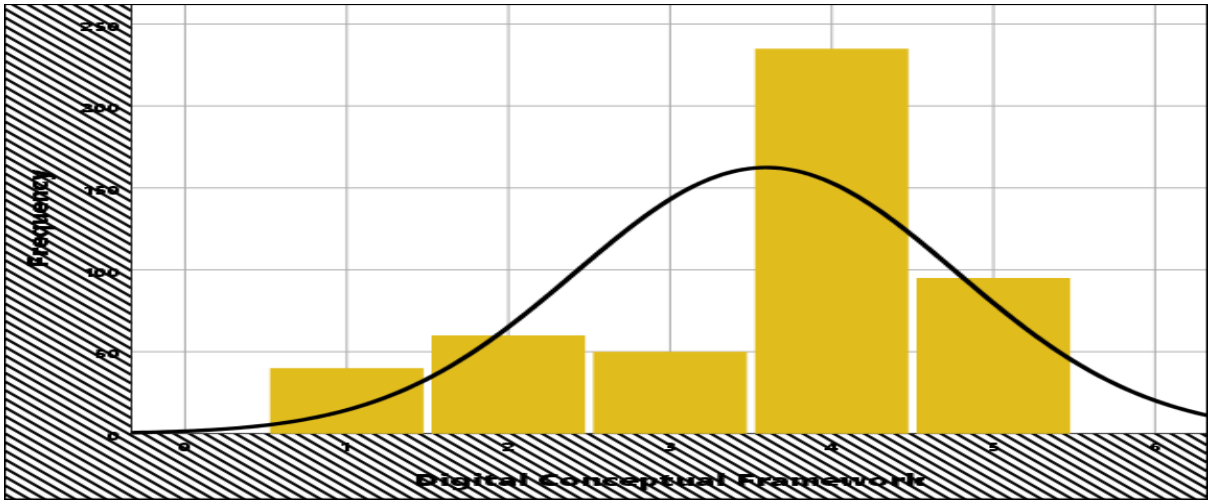
Frequency - Histogram Chart

Table 5.62: Skewness and Kurtosis Statistics

Statistics		
Digital Conceptual Framework		
N	Valid	480
	Missing	0
Skewness		-.859
Std. Error of Skewness		.111
Kurtosis		-.194
Std. Error of Kurtosis		.222

Source: Author’s Compilation

Figure 5.43 and table 5.63 below show that digital conceptual framework variable has a normal distribution with a left long tail since the skewness is negative and close to zero. Its observations cluster less because their kurtosis is negative as well. Additionally, the graph shows a departure from the symmetry because twice its standard error of skewness is more than the skewness value.



Source: Own compilation

Figure 5.43: Frequency- Histogram-Digital conceptual framework

Correlation Analysis

Since the reliability and the validity tests already confirmed appropriateness of the DIGDBS variables, table 5.63 also below shows that there is a strong relationship between Digital conceptual framework with a coefficient more than 0. 50.

Table 5.63: Correlation Analysis

Correlations

		DBS-DTI-DCE	Digital BPR	IT Project Management	SoS Reengineering/Integration	KBM & Emotional Intelligence	Employee & Stakeholders' Development	Compliance-Laws-Regulations-Acts	Compliance-Socioeconomic and Environmental Requirements	Compliance-Global and Sustainable Development Requirements	Digital Challenge Management	Digital Conceptual Framework
DBS-DTI-DCE	Pearson Correlation	1	.825**	.893**	.748**	.732**	.810**	.841**	.846**	.843**	.861**	.910**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
Digital BPR	Pearson Correlation	.825**	1	.905**	.875**	.850**	.846**	.795**	.838**	.837**	.835**	.822**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
IT Project Management	Pearson Correlation	.893**	.905**	1	.854**	.829**	.907**	.850**	.829**	.852**	.875**	.841**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
SoS Reengineering/ Integration	Pearson Correlation	.748**	.875**	.854**	1	.821**	.828**	.752**	.811**	.877**	.880**	.812**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
KBM & Emotional Intelligence	Pearson Correlation	.732**	.850**	.829**	.821**	1	.934**	.917**	.890**	.757**	.779**	.789**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
Employee & Stakeholders'D evelopment	Pearson Correlation	.810**	.846**	.907**	.828**	.934**	1	.933**	.879**	.810**	.834**	.817**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
Compliance-Laws-Regulations-Acts	Pearson Correlation	.841**	.795**	.850**	.752**	.917**	.933**	1	.883**	.801**	.820**	.852**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
Compliance-Socioeconomic and Environmental Requirements	Pearson Correlation	.846**	.838**	.829**	.811**	.890**	.879**	.883**	1	.802**	.843**	.909**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
Compliance-Global and Sustainable Development Requirements	Pearson Correlation	.843**	.837**	.852**	.877**	.757**	.810**	.801**	.802**	1	.946**	.908**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000
	N	480	480	480	480	480	480	480	480	480	480	480
Digital Challenge Management	Pearson Correlation	.861**	.835**	.875**	.880**	.779**	.834**	.820**	.843**	.946**	1	.941**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000
	N	480	480	480	480	480	480	480	480	480	480	480
Digital Conceptual Framework	Pearson Correlation	.910**	.822**	.841**	.812**	.789**	.817**	.852**	.909**	.908**	.941**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	
	N	480	480	480	480	480	480	480	480	480	480	480

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's Compilation

Regression Analysis

As part of the digital banking performance variables, it is important to find out if the DCFBP variables are significant among them. Table 5.64 depicts that R square equals to .962 which is greater than 50% and table 5.65 asserts that there is a great significance between DIGDBS variables with a Sig. coefficient less than .01.

Table 5.64: Regression Analysis – Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.981[a]	.962	.962	.231

a. Predictors: (Constant), Digital Challenge Management, KBM & Emotional Intelligence, DBS-DTI-DCE, Digital BPR, SoS Reengineering/Integration, Compliance-Socioeconomic and Environmental Requirements, IT Project Management, Compliance-Global and Sustainable Development Requirements, Compliance-Laws-Regulations-Acts, Employee & Stakeholders'Development

Source: Author's Compilation

Table 5.65: Regression Analysis – ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	640.714	10	64.071	1198.770	.000[b]
	Residual	25.067	469	.053		
	Total	665.781	479			

a. Dependent Variable: Digital Conceptual Framework

b. Predictors: (Constant), Digital Challenge Management, KBM & Emotional Intelligence, DBS-DTI-DCE, Digital BPR, SoS Reengineering/Integration, Compliance-Socioeconomic and Environmental Requirements, IT Project Management, Compliance-Global and Sustainable Development Requirements, Compliance-Laws-Regulations-Acts, Employee & Stakeholders'Development

Source: Author's Compilation

Digital Conceptual Framework Vs SA Banks

Crosstabs Analysis

The functionality of the crosstabs allows to measure and evaluate the degree of correspondence between Digital Conceptual Framework variables at each SA bank level as detailed on table 5.66 below.

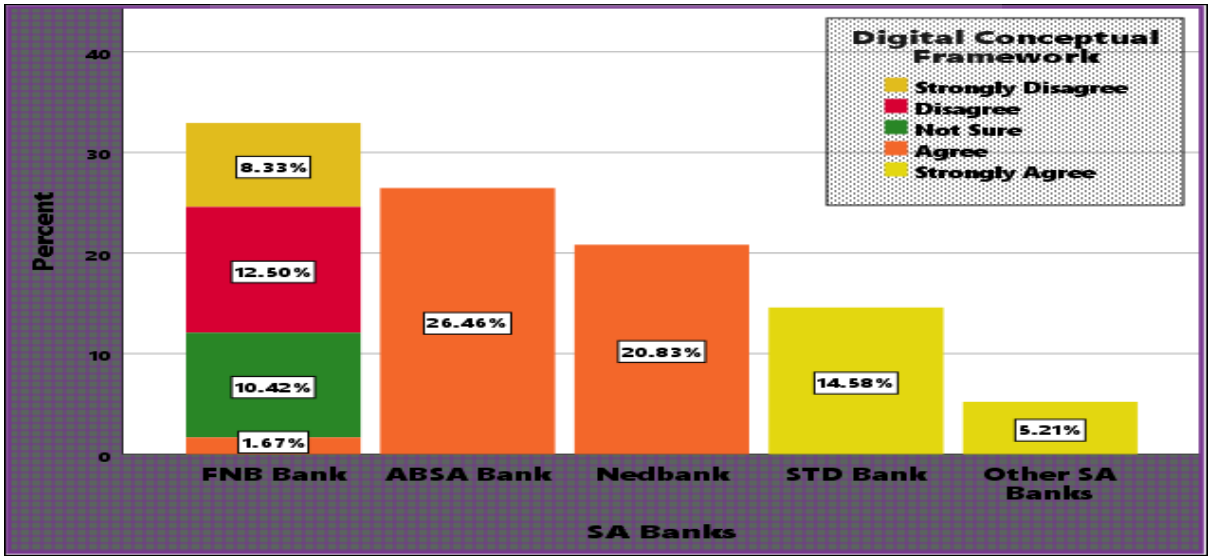
Table 5.66: Crosstab Analysis

			SA Banks					
			FNB Bank	ABSA Bank	Nedbank	STD Bank	Other SA Banks	Total
Digital Conceptual Framework	Strongly Disagree	Count	40	0	0	0	0	40
		% within Digital Conceptual Framework	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within SA Banks	25.3%	0.0%	0.0%	0.0%	0.0%	8.3%
		% of Total	8.3%	0.0%	0.0%	0.0%	0.0%	8.3%
	Disagree	Count	60	0	0	0	0	60
		% within Digital Conceptual Framework	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within SA Banks	38.0%	0.0%	0.0%	0.0%	0.0%	12.5%
		% of Total	12.5%	0.0%	0.0%	0.0%	0.0%	12.5%
	Not Sure	Count	50	0	0	0	0	50
		% within Digital Conceptual Framework	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within SA Banks	31.6%	0.0%	0.0%	0.0%	0.0%	10.4%
		% of Total	10.4%	0.0%	0.0%	0.0%	0.0%	10.4%
	Agree	Count	8	127	100	0	0	235
		% within Digital Conceptual Framework	3.4%	54.0%	42.6%	0.0%	0.0%	100.0%
		% within SA Banks	5.1%	100.0%	100.0%	0.0%	0.0%	49.0%
		% of Total	1.7%	26.5%	20.8%	0.0%	0.0%	49.0%
	Strongly Agree	Count	0	0	0	70	25	95
		% within Digital Conceptual Framework	0.0%	0.0%	0.0%	73.7%	26.3%	100.0%
		% within SA Banks	0.0%	0.0%	0.0%	100.0%	100.0%	19.8%
		% of Total	0.0%	0.0%	0.0%	14.6%	5.2%	19.8%
Total		Count	158	127	100	70	25	480

Source: Own Compilation

Stacked Histogram Percentage of Digital Conceptual Framework Vs SA Banks

Figure 5.44 below depicts that 1.67%, 26.46% and 20.83% of respondents who respectively have an FNB, Absa and Nedbank account agree on the importance of having predefined digital conceptual framework that drives management of the digital banking performance. Although 20.83% of respondents at FNB bank disagree and 10.42% are not sure of the impact, 14.58% and 5.21% of participants respectively from the STD bank and other SA banks strongly agree on the necessity to hold a digital conceptual framework as part of the banking procedures.



Source: Own Compilation

Figure 5.44: Stacked Histogram Percentage of Digital Conceptual Framework Vs SA Banks

5.3.4 Digital Banking Performance (DBP)

Table 5.67 displays digitalisation, digital BPR and the digital conceptual framework as variables of the digital banking performance.

Table 5.67: Digital Banking Performance variables

Dependent variables	**Independent variables**
Digitalisation (DIGBP)	Digital Banking Performance (DBP)
Digital BPR (DBPRBP)	Digital Banking Performance (DBP)
Digital Conceptual Framework (CDFBP)	Digital Banking Performance (DBP)

Source: Author's Compilation

Descriptive Statistics

Table 5.68: Descriptive Statistics

Descriptive Statistics

	N	Range	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
Digital Banking Strategies	480	4	1	5	1974	4.11	.708	.501
Digital Technology Innovation	480	2	3	5	2140	4.46	.539	.291
Digital Customer Experience	480	2	3	5	1970	4.10	.798	.636
Digital BPR	480	2	3	5	1935	4.03	.669	.448
Digital Conceptual Framework	480	4	1	5	1725	3.59	1.179	1.390
Digital Banking Performance	480	4	1	5	1992	4.15	.670	.449
Valid N (listwise)	480							

Source: Author's Compilation

Frequency - Pie Chart – DBP

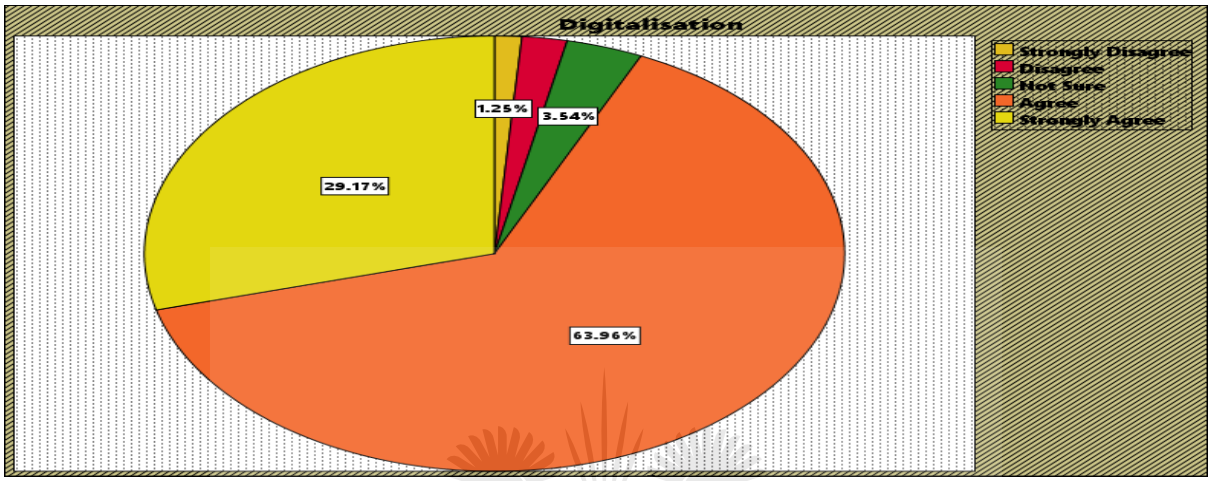
Table 5.69: Frequency-Digitalisation

Digitalisation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	1.3	1.3	1.3
	Disagree	10	2.1	2.1	3.3
	Not Sure	17	3.5	3.5	6.9
	Agree	307	64.0	64.0	70.8
	Strongly Agree	140	29.2	29.2	100.0
	Total	480	100.0	100.0	

Source: Author's Compilation

Figure 5.45 below and table 5.69 above display the percentage distribution of survey items between participants using the five Likert scale questionnaire answers. 93.20% of the respondents agreed and strongly agreed that digitalisation have a great impact on the digital banking performance.



Source: Author's Compilation

Figure 5.45: Frequency - Pie Chart - DBP

Frequency - Histogram Chart – DBP

Table 5.70: Skewness and Kurtosis Statistics

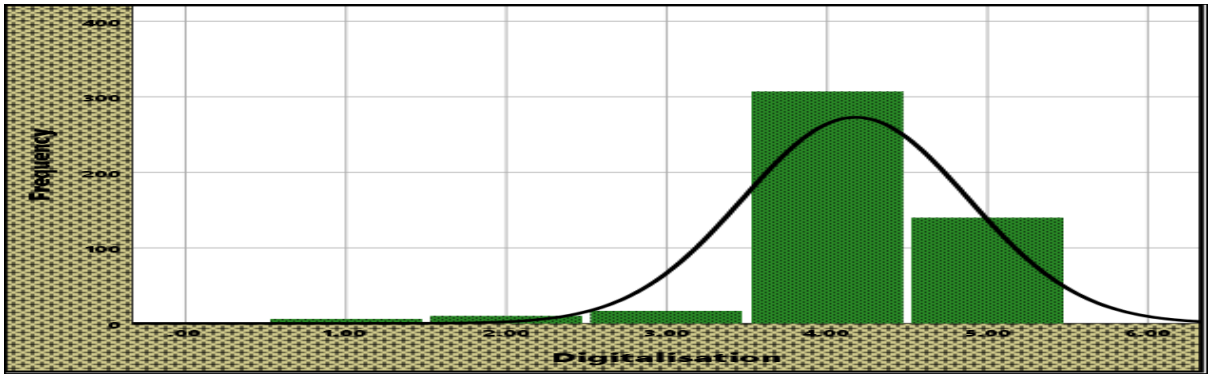
Statistics

		Digitalisation	Digital BPR	Digital Conceptual Framework	Digital Banking Performance
N	Valid	480	480	480	480
	Missing	0	0	0	0
Skewness		-1.498	-.036	-.859	-1.563
Std. Error of Skewness		.111	.111	.111	.111
Kurtosis		5.111	-.760	-.194	6.108
Std. Error of Kurtosis		.222	.222	.222	.222

Source: Author's Compilation

Digitalisation

Figure 5.46 below and table 5.70 above show that digitalisation has a normal distribution with a left long tail since the skewness is negative. Its observations cluster more because its kurtosis is positive. Additionally, the graph shows a proximity to the symmetry because twice its standard error of skewness is less than the skewness value.



Source: Author's Compilation

Figure 5.46: Histogram Chart – DIGBP

Digital BPR

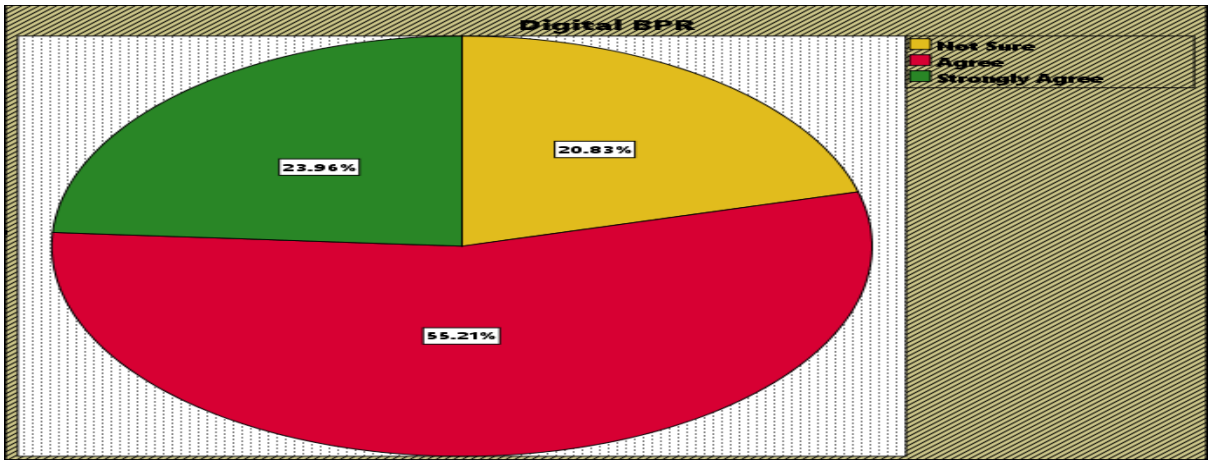
Table 5.71: Frequency-Digital BPR

Digital BPR		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Sure	100	20.8	20.8	20.8
	Agree	265	55.2	55.2	76.0
	Strongly Agree	115	24.0	24.0	100.0
	Total	480	100.0	100.0	

Source: Author's Compilation

Figure 5.47 below and table 5.71 above display the percentage distribution of survey items between participants using the five Likert scale questionnaire answers. 79.17% of the respondents agreed and strongly agreed that digitalisation have a great impact on the digital banking performance.

Frequency - Pie Chart - Digital BPR

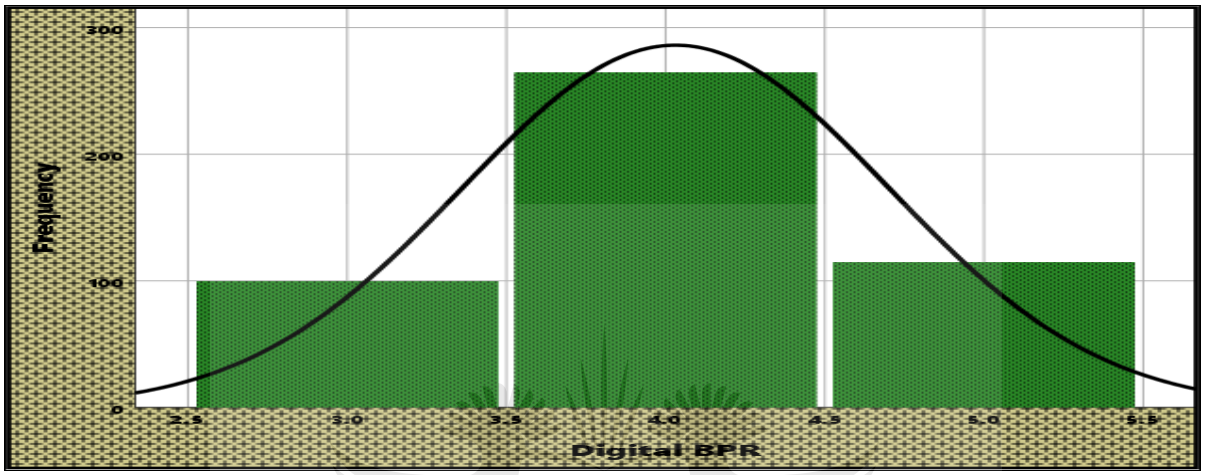


Source: Author's Compilation

Figure 5.47: Pie Chart – DBPRBP

Frequency - Histogram Chart – Digital BPR

Figure 5.48 below shows that digital BPR has a normal distribution with a left long tail since the skewness is negative. Its observations cluster less because its kurtosis is negative as well Additionally, the graph shows a proximity to the symmetry because twice its standard error of skewness is less than the skewness value.



Source: Author's Compilation

Figure 5.48: Histogram Chart – DBPRBP

Digital Conceptual Framework

Table 5.72: Frequency - DCFBP

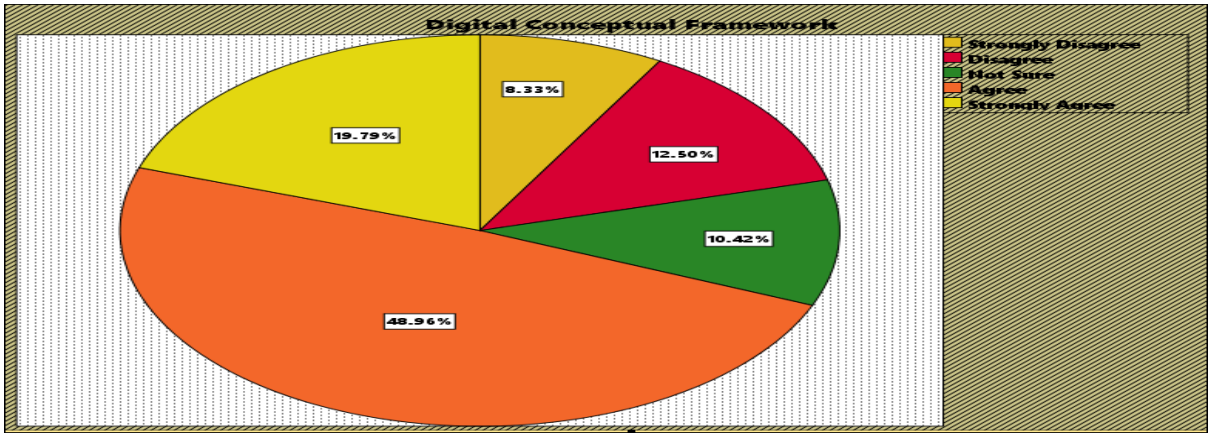
Digital Conceptual Framework

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	40	8.3	8.3	8.3
	Disagree	60	12.5	12.5	20.8
	Not Sure	50	10.4	10.4	31.3
	Agree	235	49.0	49.0	80.2
	Strongly Agree	95	19.8	19.8	100.0
	Total	480	100.0	100.0	

Source: Author's Compilation

Frequency - Pie Chart - DCFBP

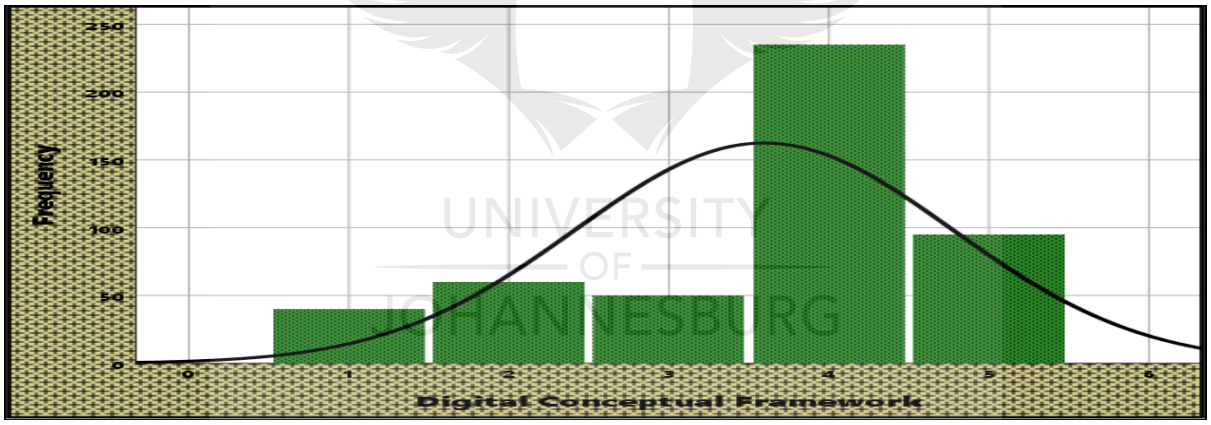
Figure 5.49 and table 5.72 display the percentage distribution of survey items between participants using the five Likert scale questionnaire answers. 68.75% of the respondents agreed and strongly agreed that efficient digital framework conceptual have a great impact on the digital performance.



Source: Author's Compilation

Figure 5.49: Frequency Pie Chart – DCFBP

Figure 5.50 below shows that digital conceptual framework has a normal distribution with a left long tail since the skewness is negative. Its observations cluster less because its kurtosis is negative as well Additionally, the graph shows a departure from the symmetry because twice its standard error of skewness is more than the skewness value.



Source: Own compilation

Figure 5.50: Frequency -Histogram-Digital Banking Performance

Correlation Analysis

Since the reliability and the validity tests already confirmed appropriateness of the DBP variables, table 5.73 below also shows that there is a strong relationship between DBP and DIGDBS (DIGDBS-DIGDTI-DIGDCE), DBPRBP and DCFBP with a coefficient more than .50.

Table 5.73: Correlation Analysis with DIGBP variables

Correlations

		Digital Banking Strategies	Digital Technology Innovation	Digital Customer Experience	Digital BPR	Digital Conceptual Framework	Digital Banking Performance
Digital Banking Strategies	Pearson Correlation	1	.636**	.600**	.766**	.720**	.959**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	480	480	480	480	480	480
Digital Technology Innovation	Pearson Correlation	.636**	1	.811**	.807**	.704**	.665**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	480	480	480	480	480	480
Digital Customer Experience	Pearson Correlation	.600**	.811**	1	.726**	.855**	.642**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	480	480	480	480	480	480
Digital BPR	Pearson Correlation	.766**	.807**	.726**	1	.822**	.766**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	480	480	480	480	480	480
Digital Conceptual Framework	Pearson Correlation	.720**	.704**	.855**	.822**	1	.725**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	480	480	480	480	480	480
Digital Banking Performance	Pearson Correlation	.959**	.665**	.642**	.766**	.725**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	480	480	480	480	480	480

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's Compilation

Table 5.74: Correlation Analysis without DIGBP variables

Correlations

		Digitalisation	Digital BPR	Digital Conceptual Framework	Digital Banking Performance
Digitalisation	Pearson Correlation	1	.809**	.743**	.951**
	Sig. (2-tailed)		.000	.000	.000
	N	480	480	480	480
Digital BPR	Pearson Correlation	.809**	1	.822**	.766**
	Sig. (2-tailed)	.000		.000	.000
	N	480	480	480	480
Digital Conceptual Framework	Pearson Correlation	.743**	.822**	1	.725**
	Sig. (2-tailed)	.000	.000		.000
	N	480	480	480	480
Digital Banking Performance	Pearson Correlation	.951**	.766**	.725**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	480	480	480	480

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's Compilation

Regression Analysis

Table 5.75 depicts that R square is 0.930 which is greater than 50%.

Table 5.75: Regression Analysis – Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.964[a]	.930	.929	.178

a. Predictors: (Constant), Digital Conceptual Framework, Digital Technology Innovation, Digital Banking Strategies, Digital Customer Experience, Digital BPR

Source: Author's Compilation

Table 5.76 asserts that there is a great significance between DBP and its variables namely DIGBP, DBPRBP and DCFBP with a Sig. coefficient less than .01.

Table 5.76: Regression Analysis – ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	200.102	5	40.020	1256.461	.000[b]
	Residual	15.098	474	.032		
	Total	215.200	479			

a. Dependent Variable: Digital Banking Performance

b. Predictors: (Constant), Digital Conceptual Framework, Digital Technology Innovation, Digital Banking Strategies, Digital Customer Experience, Digital BPR

Source: Author's Compilation

5.3.6 Digital Banking Performance and SA Banks

Crosstabs Analysis

The functionality of the crosstabs allows to measure and evaluate the degree of correspondence between DBP and its variables at each SA bank level as detailed on table 5.77 below.

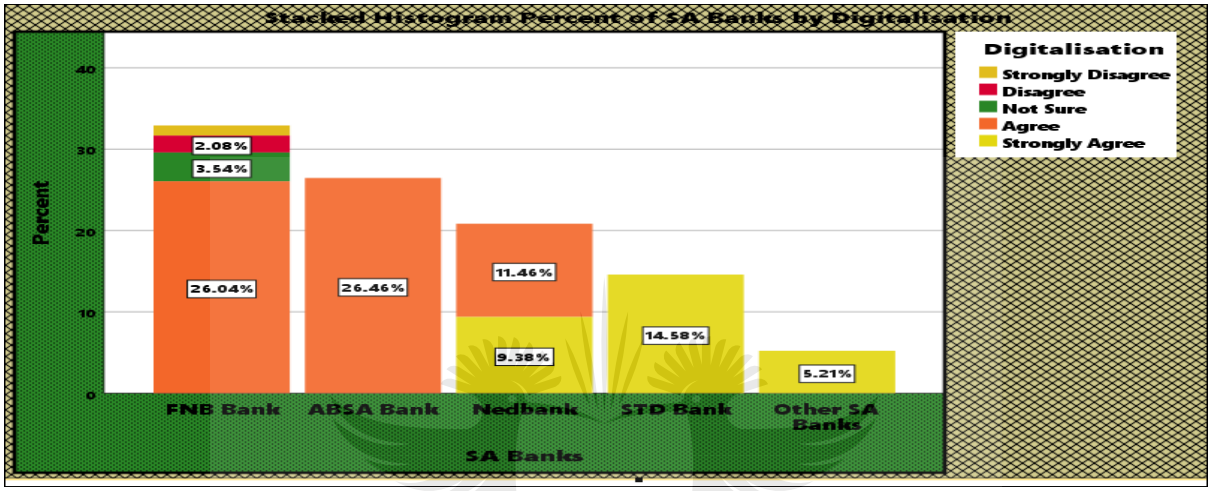
Table 5.77: Crosstab Analysis DIGBP

			SA Banks					
			FNB Bank	ABSA Bank	Nedbank	STD Bank	Other SA Banks	Total
Digitalisation	Strongly Disagree	Count	6	0	0	0	0	6
		% within Digitalisation	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within SA Banks	3.8%	0.0%	0.0%	0.0%	0.0%	1.3%
		% of Total	1.3%	0.0%	0.0%	0.0%	0.0%	1.3%
	Disagree	Count	10	0	0	0	0	10
		% within Digitalisation	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within SA Banks	6.3%	0.0%	0.0%	0.0%	0.0%	2.1%
		% of Total	2.1%	0.0%	0.0%	0.0%	0.0%	2.1%
	Not Sure	Count	17	0	0	0	0	17
		% within Digitalisation	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within SA Banks	10.8%	0.0%	0.0%	0.0%	0.0%	3.5%
		% of Total	3.5%	0.0%	0.0%	0.0%	0.0%	3.5%
	Agree	Count	125	127	55	0	0	307
		% within Digitalisation	40.7%	41.4%	17.9%	0.0%	0.0%	100.0%
		% within SA Banks	79.1%	100.0%	55.0%	0.0%	0.0%	64.0%
		% of Total	26.0%	26.5%	11.5%	0.0%	0.0%	64.0%
	Strongly Agree	Count	0	0	45	70	25	140
		% within Digitalisation	0.0%	0.0%	32.1%	50.0%	17.9%	100.0%
		% within SA Banks	0.0%	0.0%	45.0%	100.0%	100.0%	29.2%
		% of Total	0.0%	0.0%	9.4%	14.6%	5.2%	29.2%
Total		Count	158	127	100	70	25	480
		% within Digitalisation	32.9%	26.5%	20.8%	14.6%	5.2%	100.0%
		% within SA Banks	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	32.9%	26.5%	20.8%	14.6%	5.2%	100.0%

Source: Author's Compilation

Stacked Histogram Percent of DIGBP by SA Banks

Figure 5.51 below depicts that 26.04%, 26.44% and 11.46% of respondents who respectively have an FNB, Absa and Nedbank account agree on the importance of defining specific digitalisation mechanisms all aligned to the digital requirements. Although 5.62% of respondents at FNB bank disagree and are not sure of the impact, 9.38%, 14.58% and 5.21% of participants respectively from Nedbank, STD bank and other SA banks strongly agree on the neceesity to implement digital.



Source: Author's Compilation

Figure 5.51: Stacked Histogram Percent of DIGBP by SA Banks

Digital BPR Vs SA Banks

Crosstab Analysis

Table 5.78 : Crosstab Analysis

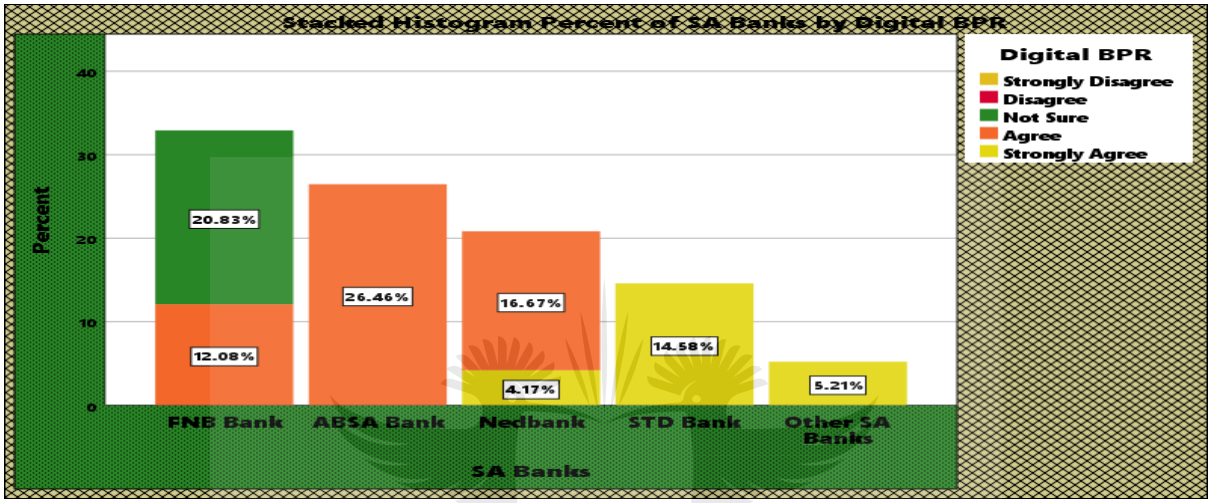
Digital BPR * SA Banks Crosstabulation

			SA Banks					
			FNB Bank	ABSA Bank	Nedbank	STD Bank	Other SA Banks	Total
Digital BPR	Not Sure	Count	100	0	0	0	0	100
		% within Digital BPR	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within SA Banks	63.3%	0.0%	0.0%	0.0%	0.0%	20.8%
		% of Total	20.8%	0.0%	0.0%	0.0%	0.0%	20.8%
	Agree	Count	58	127	80	0	0	265
		% within Digital BPR	21.9%	47.9%	30.2%	0.0%	0.0%	100.0%
		% within SA Banks	36.7%	100.0%	80.0%	0.0%	0.0%	55.2%
		% of Total	12.1%	26.5%	16.7%	0.0%	0.0%	55.2%
	Strongly Agree	Count	0	0	20	70	25	115
		% within Digital BPR	0.0%	0.0%	17.4%	60.9%	21.7%	100.0%
		% within SA Banks	0.0%	0.0%	20.0%	100.0%	100.0%	24.0%
		% of Total	0.0%	0.0%	4.2%	14.6%	5.2%	24.0%
Total		Count	158	127	100	70	25	480
		% within Digital BPR	32.9%	26.5%	20.8%	14.6%	5.2%	100.0%
		% within SA Banks	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	32.9%	26.5%	20.8%	14.6%	5.2%	100.0%

Source: Author's Compilation

Stacked Histogram Percent of DBPRBP by SA Banks

Figure 5.52 below and table 5.78 above depict that 12.08%, 26.46% and 16.67% of respondents who respectively have an FNB, Absa and Nedbank account agree on the importance of defining specific digitalisation mechanisms all aligned to the digital requirements. Although 20.83% of respondents at FNB bank are not sure of the impact, 4.17%, 14.58% and 5.21% of participants respectively from Nedbank, STD bank and other SA banks strongly agreed on the neceesity to implement digital BPR.



Source: Author's Compilation

Figure 5.52: Stacked Histogram Percent of DBPRBP by SA Banks

Digital Conceptual Framework Vs SA Banks

Crosstabs Analysis

Table 5.79: Crosstab Analysis

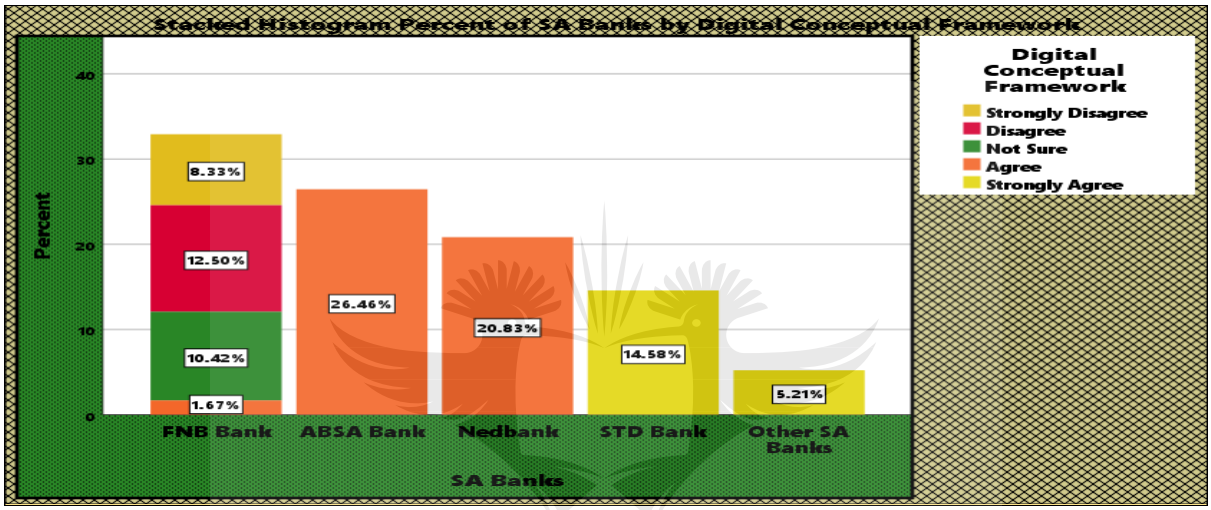
Digital Conceptual Framework * SA Banks Crosstabulation

			SA Banks					
			FNB Bank	ABSA Bank	Nedbank	STD Bank	Other SA Banks	Total
Digital Conceptual Framework	Strongly Disagree	Count	40	0	0	0	0	40
		% within Digital Conceptual Framework	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within SA Banks	25.3%	0.0%	0.0%	0.0%	0.0%	8.3%
		% of Total	8.3%	0.0%	0.0%	0.0%	0.0%	8.3%
	Disagree	Count	60	0	0	0	0	60
		% within Digital Conceptual Framework	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within SA Banks	38.0%	0.0%	0.0%	0.0%	0.0%	12.5%
		% of Total	12.5%	0.0%	0.0%	0.0%	0.0%	12.5%
	Not Sure	Count	50	0	0	0	0	50
		% within Digital Conceptual Framework	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within SA Banks	31.6%	0.0%	0.0%	0.0%	0.0%	10.4%
		% of Total	10.4%	0.0%	0.0%	0.0%	0.0%	10.4%
	Agree	Count	8	127	100	0	0	235
		% within Digital Conceptual Framework	3.4%	54%	42.6%	0.0%	0.0%	100.0%
		% within SA Banks	5.1%	100...	100.0%	0.0%	0.0%	49.0%
		% of Total	1.7%	26%	20.8%	0.0%	0.0%	49.0%
	Strongly Agree	Count	0	0	0	70	25	95
		% within Digital Conceptual Framework	0.0%	0.0%	0.0%	74%	26.3%	100.0%
		% within SA Banks	0.0%	0.0%	0.0%	100%	100.0%	19.8%
		% of Total	0.0%	0.0%	0.0%	15%	5.2%	19.8%
Total		Count	158	127	100	70	25	480
		% within Digital Conceptual Framework	32.9%	26%	20.8%	15%	5.2%	100.0%
		% within SA Banks	100.0%	100...	100.0%	100%	100.0%	100.0%

Source: Author's Compilation

Stacked Histogram Percent of DCFBP by SA Banks

Figure 5.53 below and table 5.79 above depict that 1.67%, 26.46% and 20.83% of respondents who respectively have an FNB, Absa and Nedbank account agree on the importance of defining specific digitalisation mechanisms all aligned to the digital requirements. Although 10.42% of respondents at FNB bank are not sure of the impact, 14.58% and 5.21% of participants respectively from STD bank and other SA banks strongly agreed on the neceesity to implement digital conceptual framework.



Source: Author's Compilation

Figure 5.53: Stacked Histogram Percent of DCFBP by SA Banks

Digital Banking Performance Vs SA Banks

Crosstabs Analysis

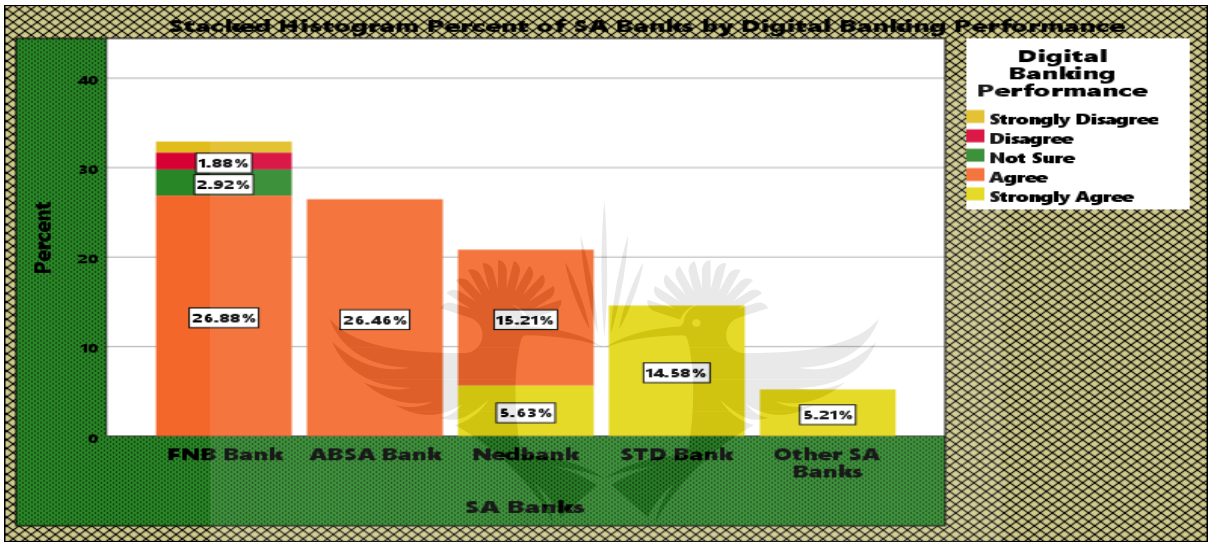
Table 5.80: Crosstab Analysis

			SA Banks					
			FNB Bank	ABSA Bank	Nedbank	STD Bank	Other SA Banks	Total
Digital Banking Performance	Strongly Disagree	Count	6	0	0	0	0	6
		% within Digital Banking Performance	100%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within SA Banks	3.8%	0.0%	0.0%	0.0%	0.0%	1.3%
		% of Total	1.3%	0.0%	0.0%	0.0%	0.0%	1.3%
	Disagree	Count	9	0	0	0	0	9
		% within Digital Banking Performance	100%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within SA Banks	5.7%	0.0%	0.0%	0.0%	0.0%	1.9%
		% of Total	1.9%	0.0%	0.0%	0.0%	0.0%	1.9%
	Not Sure	Count	14	0	0	0	0	14
		% within Digital Banking Performance	100%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within SA Banks	8.9%	0.0%	0.0%	0.0%	0.0%	2.9%
		% of Total	2.9%	0.0%	0.0%	0.0%	0.0%	2.9%
	Agree	Count	129	127	73	0	0	329
		% within Digital Banking Performance	39.2%	39%	22.2%	0.0%	0.0%	100.0%
		% within SA Banks	81.6%	100%	73.0%	0.0%	0.0%	68.5%
		% of Total	26.9%	26%	15.2%	0.0%	0.0%	68.5%
	Strongly Agree	Count	0	0	27	70	25	122
		% within Digital Banking Performance	0.0%	0.0%	22.1%	57.4%	20.5%	100.0%
		% within SA Banks	0.0%	0.0%	27.0%	100.0%	100.0%	25.4%
		% of Total	0.0%	0.0%	5.6%	14.6%	5.2%	25.4%
Total		Count	158	127	100	70	25	480
		% within Digital Banking Performance	32.9%	26%	20.8%	14.6%	5.2%	100.0%
		% within SA Banks	100%	100%	100.0%	100.0%	100.0%	100.0%
		% of Total	32.9%	26%	20.8%	14.6%	5.2%	100.0%

Source: Author's Compilation

Stacked Histogram percent Digital Banking Performance Vs SA Banks

Figure 5.54 and table 5.80 depict that 26.88%, 26.46% and 15.21% of respondents who respectively have an FNB, Absa and Nedbank account agree on the importance of defining specific digitalisation mechanisms all aligned to the digital requirements. Although 4.80% of respondents at FNB bank disagree and are not sure of the impact, 5.63% and 14.68% and 5.21%of participants respectively from Nedbank, STD bank and other SA banks strongly agreed on the neceesity to implement digital banking performance.



Source: Author's Compilation

Figure 5.54: Stacked Histogram Percent of DBP by SA Banks

5.3.7 Hypothesis Testing

5.3.7.1 Correlation Analysis

Table 5.81 below depicts that digital banking performance variables have a strong relationship among them. Correlation between DIGBP and DBPRBP, DBCFBP and DBP with is respectively 95.10%, 76.60% and 72.50%.

Table 5.81: Correlation analysis DBP

Correlations

		Digitalisation	Digital BPR	Digital Conceptual Framework	Digital Banking Performance
Digitalisation	Pearson Correlation	1	.809**	.743**	.951**
	Sig. (2-tailed)		.000	.000	.000
	N	480	480	480	480
Digital BPR	Pearson Correlation	.809**	1	.822**	.766**
	Sig. (2-tailed)	.000		.000	.000
	N	480	480	480	480
Digital Conceptual Framework	Pearson Correlation	.743**	.822**	1	.725**
	Sig. (2-tailed)	.000	.000		.000
	N	480	480	480	480
Digital Banking Performance	Pearson Correlation	.951**	.766**	.725**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	480	480	480	480

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's Compilation

5.3.7.2 Regression Analysis

The overall R square is 0.912 which is greater than 50% as detailed on table 5.82 below Additionally, the ANOVA table asserts that there is a great significance between DBP variables because of a Sig. coefficient less than .01.

Table 5.82: Regression Analysis – Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.955[a]	.912	.912	.199

a. Predictors: (Constant), Digital Conceptual Framework, Digitalisation, Digital BPR

Source: Author's Compilation

Table 5.83 displays R Square = .955. This means that digitalisation, digital BPR and the digital conceptual framework account for 95.5% of the variance of the Digital banking performance in South Africa. The ANOVA table below tells if the R Square is significant or not.

Table 5.83: Regression Analysis – ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	196.328	3	65.443	1650.643	.000[b]
	Residual	18.872	476	.040		
	Total	215.200	479			

a. Dependent Variable: Digital Banking Performance

b. Predictors: (Constant), Digital Conceptual Framework, Digitalisation, Digital BPR

Source: Author's Compilation

$F(3, 476) = 1650.643$, $p < .01$, R Square = .955

5.3.7.3 Hypothesis Analysis

The current study emphasises on the following hypotheses tested at a 1% significance level. Determined variables from 2010 to 2019 will allow to criteria as if P-value <B, reject the null hypothesis; if P-value > B, accept the null hypothesis. B represents the level of significance.

Hypothesis 1

Ho 1: Digitalisation has no statistically significant impact on the digital banking performance in South Africa.

HA1: Digitalisation has a statistically significant impact on the digital banking performance in South Africa..

In this hypothesis, the correlation matrix between the independent variables (DBP) and the dependent variable named DIGBP is evaluated. Results show that there is a significant and positive relationship between the Digitalisation and the digital banking performance in the South African banks, r (478), p<.01. Therefore, hypothesis 1 is accepted and the null hypothesis is rejected.

Hypothesis 2

Ho 2: Business process reengineering has no statistically significant impact on the digital banking performance in South Africa.

HA2: Business process reengineering has a statistically significant impact on the digital banking performance in South Africa.

In this hypothesis, the correlation matrix between the independent variables (DBP) and the dependent variable named DBPRBP is evaluated. Results show that there is a significant and positive relationship between the Digital BPR and the digital banking performance in the South African banks, r (478), p<.01. Therefore, hypothesis 2 is accepted and the null hypothesis is rejected.

Hypothesis 3

Ho 3: Implementation Digital conceptual framework has no statistically significant impact on the digital banking performance in South Africa.

HA 3: Implementation Digital conceptual framework has a statistically significant impact on the digital banking performance in South Africa.

In this hypothesis, the correlation matrix between the independent variables (DBP) and the dependent variable named DCFBP is evaluated. Results show that there is a significant and positive relationship between the Digital conceptual framework and the digital banking performance in the South African banks, r (478), p<.01. Therefore, hypothesis 3 is accepted and the null hypothesis is rejected.

5.3.7.4 Hypothesis Summary

At a 1% significance level, null hypothesis is rejected meaning that digitalisation variables have a positive and significant impact on the digital banking performance. Additionally, correlation between DIGBP and DBPRBP, DBCFBP and DBP with is respectively 95.10%, 76.60% and 72.50%. Furthermore, the relationship is strongly significant because the significance F equals 0.000 and their P-values are less than 0.01 as presented on table 5.84.

Table 5.84: Hypotheses decision

Hypotheses	P-Value	Decision
Hypothesis 1	.000	Accepted H1 and Reject Ho
Hypothesis 2	.000	Accepted H2 and Reject Ho
Hypothesis 3	.000	Accepted H3 and Reject Ho

Source: Own compilation

5.3.7.5 Regression Model

Following summary outputs, the regression model appears as displayed on table 5.85.

Table 5.85: Regression statistics

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.021	.082		.250	.803
	Digitalisation	.847	.020	.887	42.294	.000
	Digital BPR	.209	.033	.209	6.403	.000
	Digital Conceptual Framework	-.070	.019	-.123	-3.774	.000

a. Dependent Variable: Digital Banking Performance

Correlation is significant at 1% level.

Source: Own Compilation

The p-value calculated at a significance level of 99% gives coefficient less than 0.01 (1%) for all dependent variables. This suggests that DIGBP, DBPRBP and DCFBP are statistically

significant in affecting digital banking performance in South Africa. Based on statistical data from the regression model, digital banking performance equation can be updated as follow:

DBP = β0 + β1 DIGBP + β2 DBPRBP + β3 DCFBP + £ (1)

The regression model becomes:

DBP= 0.021 + 0.847 DIGBP + 0.209 DBPRBP – 0.070 DCFBP + £ (2)

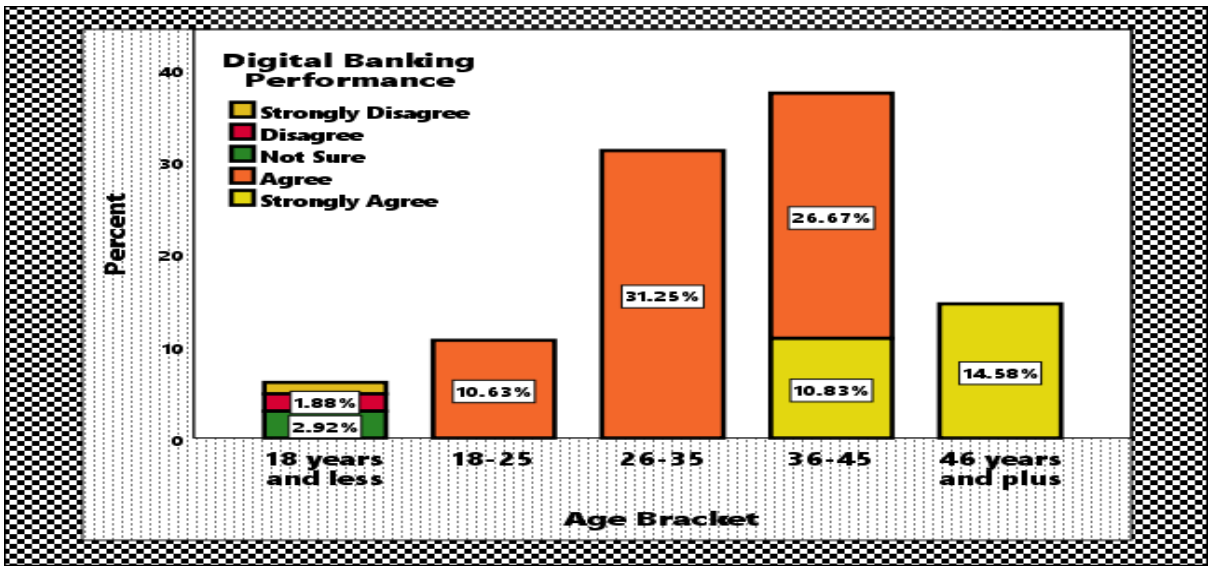
If DIGBP, DBPRBP and DCFBP have a zero value, implementation of the digital banking performance will fail since the value will be zero: The intercept has a positive value. The situation gets even worse if only the slope for digital conceptual framework is considered. In that case, the digital banking performance will dramatically fail with a negative and predicted value of 0.49. This finally suggests that a successful implementation of digital banking performance must include all DBP variables for efficiency purposes.

5.4 Digital Banking Performance and the Biographical Profile

This biography section allows to identify generic characteristics among the chosen sample regarding digital banking performance.

5.4.1 Banking performance - Age Bracket

Below are the data collected from the 480 respondents regarding digital banking performance (DBP) and the age bracket. Figure 5.55 shows that 1.88% respondents that have less than 18 years old disagreed on the impact of the DIGBP, DBPRBP and the DCFBP on the improvement of the digital performance of SA banks. 1.88% of the 480 respondents were not sure for their response because of the lack of knowledge around the 4IR.



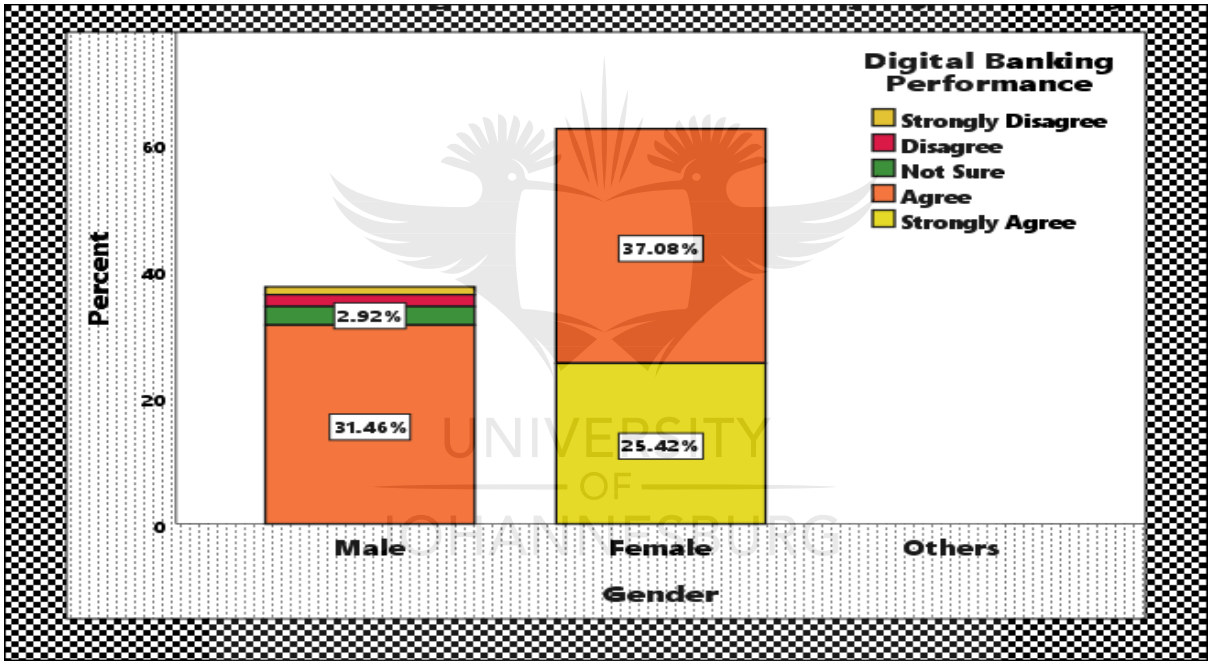
Source: Author's Compilation

Figure 5.55: Stacked Historgram Percent of DBP by Age Bracket

On the other side, 10.63%, 31.25% and 26.67% that respectively have between 18-25, 26-35 and 36-45 agreed on the significant impact of digital banking performance variables. Furthermore, 14.58 % of people who have 46 years old and more strongly agreed that the digitalisation, digital BPR and a well-structured digital conceptual framework influence the overall digital banking performance in South Africa.

5.4.2 Digital Banking performance - Gender

Below are the data collected from the 480 respondents regarding digital banking performance (DBP) and the gender.



Source: Author's Compilation

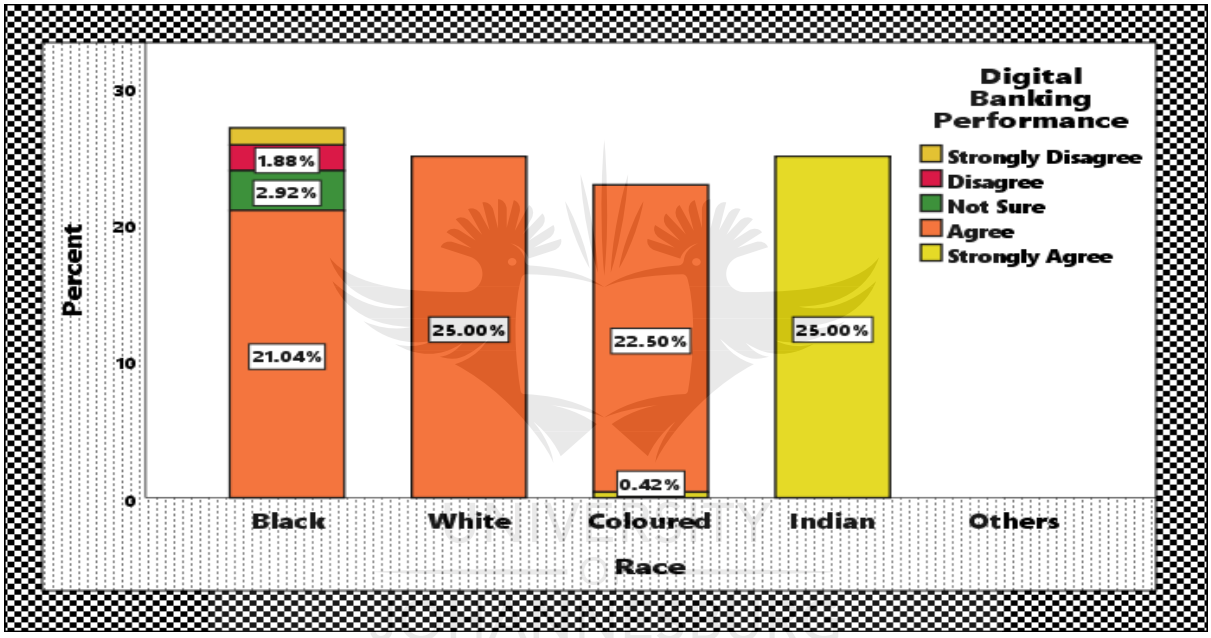
Figure 5.56: Stacked Histogram Percent of Digital Banking Performance by Gender

Figure 5.56 shows that 31.46 % of the respondents who strongly agreed that digitalisation and digital BPR as well as a well-structured digital conceptual framework have a great influence on the overall digital bank performance in South Africa are males against 37.08 % of females who agreed and 25.42% that strongly agreed. Evidence showed that the gender variable has become a critical one since the South African government strives for women empowerment.

5.4.3 Digital Banking performance - *Race*

Below are the data collected from the 480 respondents regarding digital banking performance (DBP) and the race. This variable is a very important factor since the B-BBEE compliance is based on the race with privilege given to black people that represent a higher rate of the population.

Figure 5.57 shows that 1.88% of black respondents strongly disagreed and disagreed on the impact of the DIGBP, DBPRBP and the DCFBP on the enhancement of the digital banking performance of SA banks. 2.92% of the 480 respondents were not sure for their response because of the lack of knowledge around the 4IR.



Source: Author's Compilation

Figure 5.57: Stacked Histogram Percent of Digital Banking Performance by Race

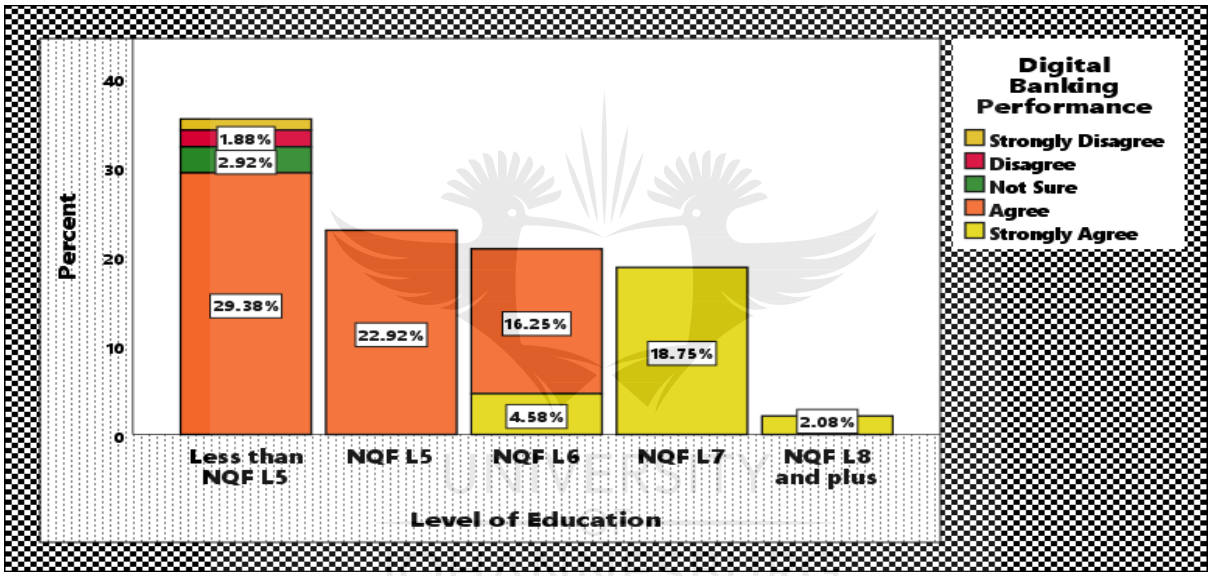
Findings revealed that 21.04%, 25.00% and 22.50% that are respectively black, white and coloured agreed on the significant impact of digital banking performance variables. Furthermore, 25.00 % of Indian respondents strongly agreed that the digitalisation, digital BPR and a well-structured digital conceptual framework ultimately influence the overall digital banking performance in South Africa.

5.4.4 Banking performance - Education Level

Below are the data collected from the 480 respondents regarding digital banking performance (DBP) and the education level.

Figure 5.58 shows that 1.88% of respondents that have less than NQF L5 strongly disagreed and disagreed on the impact of the DIGBP, DBPRBP and the DCFBP on the enhancement of the digital banking performance of SA banks. 2.92% of the 480 respondents were not sure for their response because of the lack of knowledge around the 4IR.

Findings revealed that 29.38%, 22.92% and 16.25% of respondents that hold respectively NQF L5, NQF L6, NQF L7 and NQF L8 and more agreed on the significant impact of digital banking performance variables. Furthermore, 4.58 %, 18.75% and 2.08% of respondents that respectively hold NQF L6, NQF L7 and NQF L8 and plus strongly agreed that the digitalisation, digital BPR as well as a well-implemented digital conceptual framework ultimately influence the overall digital banking performance in South Africa.



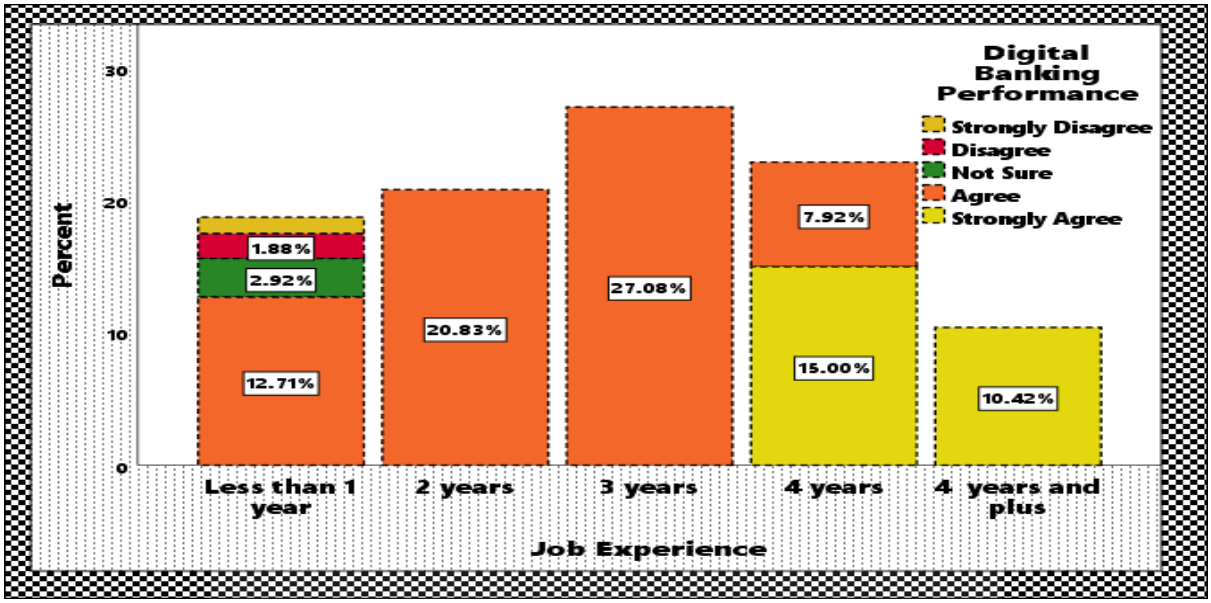
Source: Author's Compilation

Figure 5.58: Stacked Histogram Percent of Digital Banking Performance by level of Education

5.4.5 Banking performance - *Job Experience*

Below are the data collected from the 480 respondents regarding digital banking performance (DBP) and the job experience. This variable equally tells about the low employment rate in South Africa.

Figure 5.59 shows that 1.88% of respondents that have less than one-year experience at their job place strongly disagreed and disagreed on the impact of the DIGBP, DBPRBP and the DCFBP on the enhancement of the digital banking performance of SA banks. 2.92% of the 480 respondents were not sure for their response because of the lack of knowledge around the 4IR.



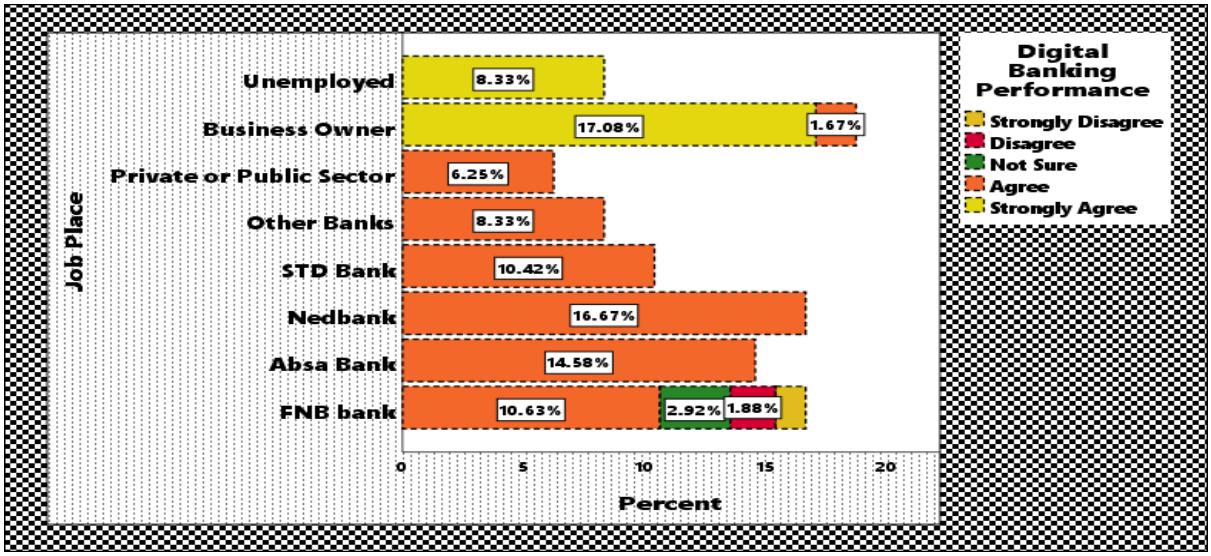
Source: Author's Compilation

Figure 5.59: Stacked Histogram Percent of Digital Banking Performance by Job Experience

Findings revealed that 12.71%, 20.83%, 27.08% and 7.92% of respondents that respectively have 2, 3, 4 years of experience and more agreed on the significant impact of digital banking performance variables. Furthermore, 15.00 % and 10.42% that respectively 4 years of experience and more strongly agreed that the digitalisation, digital BPR as well as a well-implemented digital conceptual framework eventually influence the overall digital banking performance in South Africa.

5.4.6 Banking performance - *Job Place*

The job place variable allowed to principally find people working at the big four banks among the chosen sample. Below are the data collected from the 480 respondents regarding digital banking performance (DBP) and the job places. Data collection showed that 16.67% of the respondents work at FNB bank, 14.58% at Absa bank, 16.67% at Nedbank, 10.42% at STD bank and 8.33% work at other SA banks while 6.25% work at the private and public sector, 18.75% are business owners and 8.33% are unemployed. Although the study does not focus on these elements, the unemployed factor will guide compliance to the B-BBEE by banks.



Source: Author's Compilation

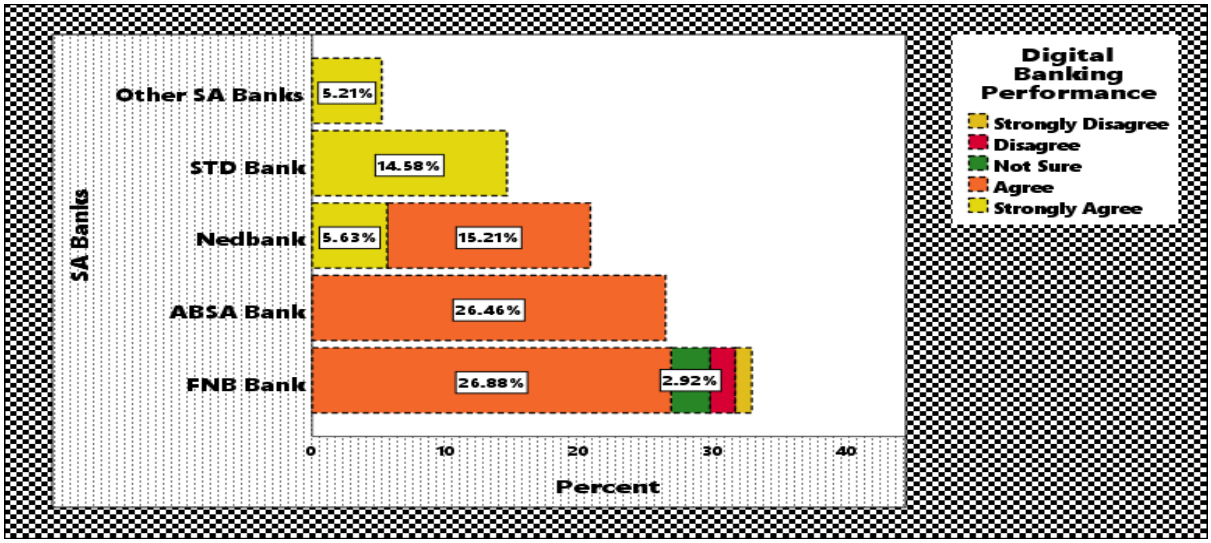
Figure 5.60: Stacked Histogram Percent of Digital Banking Performance by Job Place

Figure 5.60 revealed that among the chosen sample, 10.63%, 14.58%, 16.67%, 10.42%, 8.33%, 6.25% and 1.67% that respectively work at FNB bank, Absa Bank, Nedbank, STD bank, other SA banks, private or public and business owners agreed on the interaction and good relationship between digital banking performance variables. 1.88% of participants from FNB bank disagreed on the relationship while 2.92% were not even sure of what to say. However, 17.08% and 8.33% of respondents that are business owners and unemployed people strongly agreed that the digitalisation, the reengineering of BP and a well-organised digital conceptual framework strongly impact digital bank performance in South Africa.

5.4.7 Digital Banking performance - South African bank account

This section talks about the number of respondents who hold SA bank account which is different their workplace. Some respondents were working at a specific bank but was having their principal bank account in another bank. Over the chosen sample of 480 respondents, 158, 127, 100, 70 and 25 respectively hold bank account at FNB, Absa, Nedbank, Standard bank and at other SA banks as indicated in the crosstab analysis.

Figure 5.61 shows that 26.88%, 26.46% and 15.21% of respondents that respectively have FNB bank, Absa bank and Nedbank agreed on the impact of the DIGBP, DBPRBP and the DCFBP on the enhancement of the digital banking performance of SA banks. 2.92% of the 480 respondents were not sure for their response because of the lack of knowledge around the digitalisation. However, 5.63%, 14.58% and 5.21% of the participants that respectively have a Nedbank, STD bank and other SA banks.



Source: Author's Compilation

Figure 5.61: Stacked Histogram Percent of Digital Banking Performance by SA Banks

5.5 Customer satisfaction

A separate interview was made regarding the overall satisfaction of the customers. Table 5.86 below display statements that were considered to extract the level of their satisfaction.

Table 5.86: Customer Satisfaction Variables

Dependent Variables	Independent Variable
Well-Structured Banking Processes	Customer Satisfaction (DCS)
Banks' Contribution to the Socioeconomic and Environmental Needs	Customer Satisfaction (DCS)
Efficient of the Banking Omni-Channels	Customer Satisfaction (DCS)
Adequate Products/Service Delivery	Customer Satisfaction (DCS)
Banking P/S Partly Done Online	Customer Satisfaction (DCS)
Banking Security Measures Still Required Perfection	Customer Satisfaction (DCS)
Banks' Staff Less Competent and Slow	Customer Satisfaction (DCS)
Fair Customer Treatment/Interest Rates/Bank Charges	Customer Satisfaction (DCS)
Fulfilment of Promises Made to Customers	Customer Satisfaction (DCS)

Supporting Customer Education/Financial Literacy	Customer Satisfaction (DCS)
Running Customer Satisfaction Survey	Customer Satisfaction (DCS)

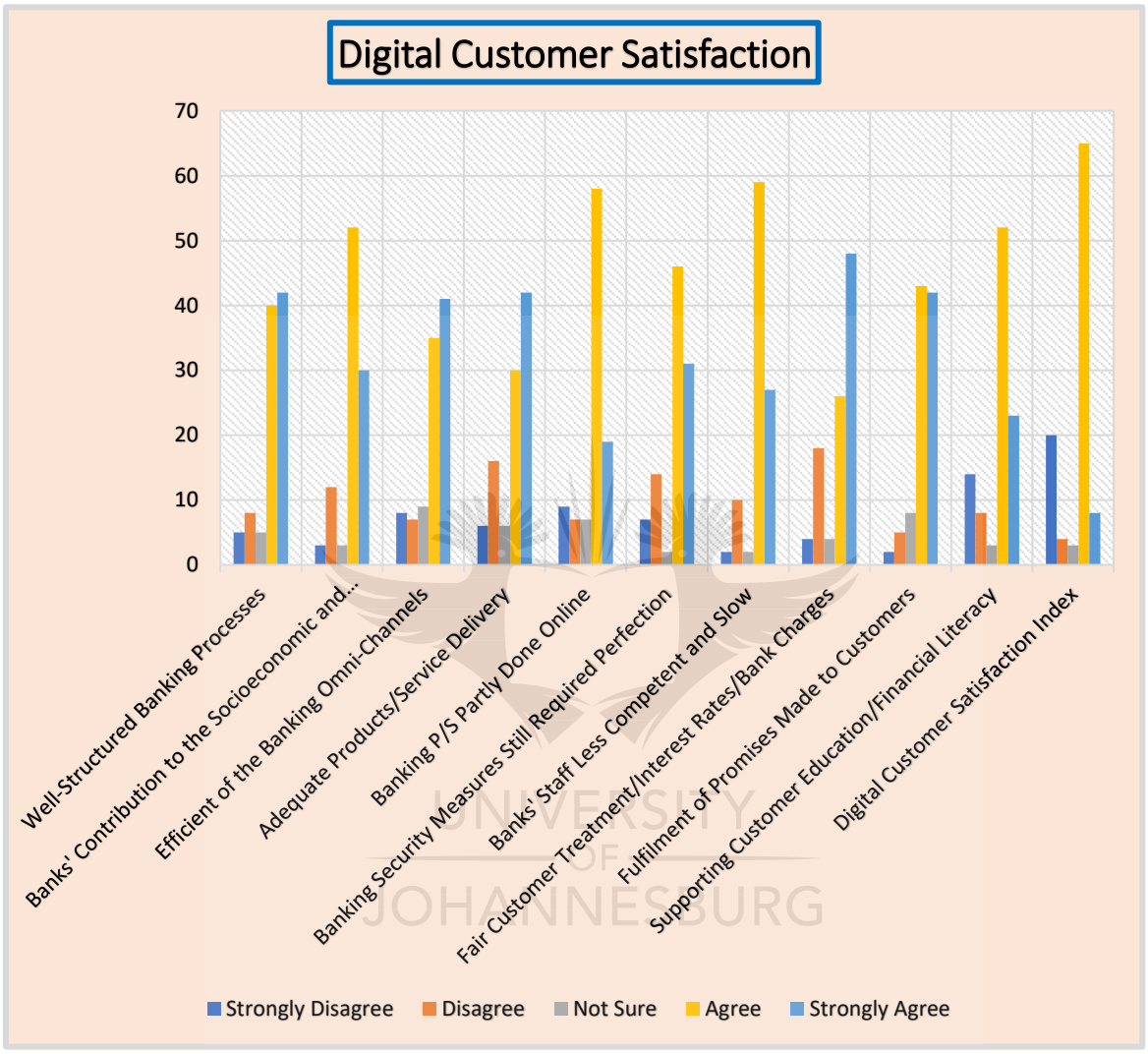
Source: Own Compilation

Table 5.87: Percentage distribution of the digital customer satisfaction variables

Digital Customer Satisfaction Variables	**Strongly Disagree**	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**
Well-Structured Banking Processes	5%	8%	5%	40%	42%
Banks' Contribution to the Socioeconomic and Environmental Needs	3%	12%	3%	52%	30%
Efficient of the Banking Omni-Channels	8%	7%	9%	35%	41%
Adequate Products/Service Delivery	6%	16%	6%	30%	42%
Banking P/S Partly Done Online	9%	7%	7%	58%	19%
Banking Security Measures Still Required Perfection	7%	14%	2%	46%	31%
Banks' Staff Less Competent and Slow	2%	10%	2%	59%	27%
Fair Customer Treatment/Interest Rates/Bank Charges	4%	18%	4%	26%	48%
Fulfilment of Promises Made to Customers	2%	5%	8%	43%	42%
Supporting Customer Education/Financial Literacy	14%	8%	3%	52%	23%
Digital Customer Satisfaction Index	20%	4%	3%	65%	8%

Source: Own Compilation

Findings show that 88% of respondents approved that customer service delivery is at the point in all South African banks. Although 86% of the respondents argued that Bank' staff are not always qualified, and some banking processes still require going to the bank, the overall outcomes is substantial.



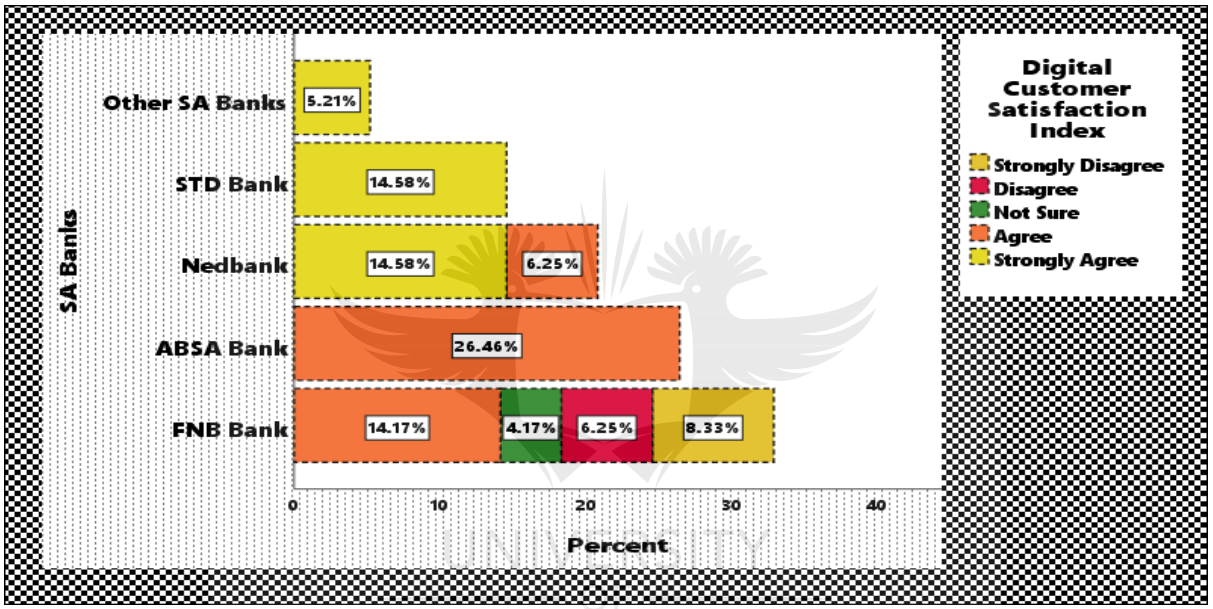
Source: Own Compilation

Figure 5.62: Customer Satisfaction Index

Figure 5.62 above represents the digital banking performance' behaviour towards digital customer satisfaction from the products and services provided by South African banks. Digital banking performance has an exponential curve when those variables are putting together. It also shows that efficiency is insured when customer satisfaction variables are met.

Figure 5.63 below represents the degree of perception of the Digital Customer Satisfaction Index in SA Banks. It shows that 14.17%, 26.46% and 6.25% of respondents that respectively

have FNB bank, Absa bank and Nedbank account agreed on the importance of the digital customer index in improving digital banking performance in South Africa. 8.33% and 6.25% of respondents that have an account at FNB bank respectively strongly disagreed and disagreed on the critical impact of knowing what improves digital customer satisfaction. Moreover, 4.17% of respondents from FNB bank were not sure of the right response due to some limitations. However, 14.58%, 14.58% and 5.21% of the 480 respondents that have bank account at respectively Nedbank, STD bank and other SA banks strongly agreed on the significant role of the digital customer satisfaction index in the process of implementing a successful digital banking performance in South Africa.



Source: Author's Compilation

Figure 5.63: Stacked Histogram Percent of Digital Customer Satisfaction Index by SA Banks

5.6 Conclusion

This chapter provided discussion and findings based on both the literature review and the primary data collected from interviews and research questionnaires. Findings based on the literature review showed that emerging digital strategies, smart technologies and customer experience contribute to the enhancement of banking digital performance. Furthermore, digital business process reengineering drives the overall business transformation. Previous studies emphasised on the importance of using banking frameworks to improve their digital performance.

Results obtained from the analysis of data collection revealed that the chosen digital banking performance variables are valid and reliable as outlined by the Cronbach's Alpha coefficient.

Research findings established that digital banking performance variables have a strong, positive and significant relationship among them because the ccorrelation between DIGBP and DBPRBP, DBCFBP and DBP is respectively 95.10%, 76.60% and 72.50% while the coefficient of significance is .000 at a significance level of 1%. The R square value is .955 meaning that digitalisation, digital BPR and the digital conceptual framework account for 95.5% of the variance of the Digital banking performance in South Africa.

Following the regression analysis coefficients, the regression model can be expressed as follow: DBP= 0.021 + 0.847 DIGBP + 0.209 DBPRBP – 0.070 DCFBP + £

If DIGBP, DBPRBP and DCFBP have a zero value, implementation of the digital banking performance will fail since the value will be zero: The intercept has a positive value. The situation gets even worse if only the slope for digital conceptual framework is considered. In that case, the digital banking performance will dramatically fail with a negative and predicted value of 0.49. This finally suggests that a successful implementation of digital banking performance must include all DBP variables for efficiency purposes.

Demographic elements such as age, gender. race, education level, job experience, job place and My/SA banks were used to analyse the perception of respondents towards factors that influence digital banking performances in South Africa. Cross tabulation analysis was used to establish the rapport between digital banking performance and the biographical profile. Results showed that:

Age: 1.88% respondents that have less than 18 years old disagreed on the impact of the DIGBP, DBPRBP and the DCFBP on the improvement of the digital performance of SA banks. 2.92% of the 480 respondents were not sure for their response because of the lack of knowledge around the 4IR. On the other side, 10.63%, 31.25% and 26.67% that respectively have between 18-25, 26-35 and 36-45 agreed on the significant impact of digital banking performance variables. Furthermore, 14.58 % of people who have 46 years old and more strongly agreed that the digitalisation, digital BPR and a well-structured digital conceptual framework influence the overall digital banking performance in South Africa.

Gender: 31.46 % of the respondents who strongly agreed that digitalisation and digital BPR as well as a well-structured digital conceptual framework have a great influence on the overall

digital bank performance in South Africa are males against 37.08 % of females who agreed and 25.42% that strongly agreed. Evidence showed that the gender variable has become a critical one since the South African government strives for women empowerment.

Research on digital banking performance revealed that efficiency of banks is influenced by both national and international factors. The government together with the SARB define regulations, laws and Acts to be followed by financial institutions for better results over the South African economic.

Race: Findings revealed that 21.04%, 25.00% and 22.50% that are respectively black, white and coloured agreed on the significant impact of digital banking performance variables. Furthermore, 25.00 % of Indian respondents strongly agreed that the digitalisation, digital BPR and a well-structured digital conceptual framework ultimately influence the overall digital banking performance in South Africa.

Education level: Findings revealed that 29.38%, 22.92% and 16.25% of respondents that hold respectively NQF L5, NQF L6, NQF L7 and NQF L8 and more agreed on the significant impact of digital banking performance variables. Furthermore, 4.58 %, 18.75% and 2.08% of respondents that respectively hold NQF L6, NQF L7 and NQF L8 and plus strongly agreed that the digitalisation, digital BPR as well as a well-implemented digital conceptual framework ultimately influence the overall digital banking performance in South Africa.

Job experience: Findings revealed that 12.71%, 20.83%, 27.08% and 7.92% of respondents that respectively have 2, 3, 4 years of experience and more agreed on the significant impact of digital banking performance variables. Furthermore, 15.00 % and 10.42% that respectively 4 years of experience and more strongly agreed that the digitalisation, digital BPR as well as a well-implemented digital conceptual framework eventually influence the overall digital banking performance in South Africa.

Job place: Data collection showed that 16.67% of the respondents work at FNB bank, 14.58% at Absa bank, 16.67% at Nedbank, 10.42% at STD bank and 8.33% work at other SA banks while 6.25% work at the private and public sector, 18.75% are business owners and 8.33% are unemployed. Furthermore, 10.63%, 14.58%, 16.67%, 10.42%, 8.33%, 6.25% and 1.67% that respectively work at FNB bank, Absa Bank, Nedbank, STD bank, other SA banks, private or public and business owners agreed on the interaction and good relationship between digital banking performance variables.

1.88% of participants from FNB bank disagreed on the relationship while 2.92% were not even sure of what to say. However, 17.08% and 8.33% of respondents that are business owners and unemployed people strongly agreed that the digitalisation, the reengineering of BP and a well-organised digital conceptual framework strongly impact digital bank performance in South Africa.

SA bank account: Over the chosen sample of 480 respondents, 158, 127, 100, 70 and 25 respectively hold bank account at FNB, Absa, Nedbank, Standard bank and at other SA banks as indicated in the crosstab analysis. 26.88%, 26.46% and 15.21% of respondents that respectively have FNB bank, Absa bank and Nedbank agreed on the impact of the DIGBP, DBPRBP and the DCFBP on the enhancement of the digital banking performance of SA banks. 2.92% of the 480 respondents were not sure for their response because of the lack of knowledge around the digitalisation. However, 5.63%, 14.58% and 5.21% of the participants that respectively have a Nedbank, STD bank and other SA banks agreed and strongly agreed.

Since banking automation aims to improve satisfaction of the customers, results showed that 88% of respondents approved that customer service delivery is at the point in all South African banks. Although 86% of the respondents argued that Bank' staff are not always qualified, and some banking processes still require going to the bank, the overall outcomes is substantial. It shows that 14.17%, 26.46% and 6.25% of respondents that respectively have FNB bank, Absa bank and Nedbank account agreed on the importance of the digital customer index in improving digital banking performance in South Africa. 8.33% and 6.25% of respondents that have an account at FNB bank respectively strongly disagreed and disagreed on the critical impact of knowing what improves digital customer satisfaction. Moreover, 4.17% of respondents from FNB bank were not sure of the right response due to some limitations. However, 14.58%, 14.58% and 5.21% of the 480 respondents that have bank account at respectively Nedbank, STD bank and other SA banks strongly agreed on the significant role of the digital customer satisfaction index in the process of implementing a successful digital banking performance in South Africa.

CHAPTER SIX

RESULTS BASED ON SECONDARY SOURCES

6.1 Introduction

Statistical tests proved that there is a strong relationship between bank performance and the level of digitalisation applied at the bank. From digital strategies to digital technology innovations, digital customer experience and related change are to be managed accordingly. Based on the statistical analysis done in this study, the following sections will be covering all bank performance variables with a focus on each South African Bank.

6.2 Digital Strategies

Depending on the stage where the bank in the digitalisation process, different approaches can be adopted to reach the vision and the mission of the organisation. Effectively, the increase of digital channel through innovative approaches and solutions are used throughout the supply and the demand chain in the financial markets opening doors to omnichannel strategies (Oracle, 2018). Data analysis showed that digital strategies applied at the South African banks are the differentiation, market positioning, market segmentation, customer and product-centric, change-driven leadership and security-driven strategies.

6.2.1 Digital strategies at Absa bank

Business strategies at Absa bank is overseen by the Absa Group Executive Committee and put into practice by the independent and executive directors. Strategic objectives are all about growing the portfolio, reducing costs and delivering sustainable profits to ensure long-term survival.

Vision: The vision is about bringing possibilities to life

Mission: The mission is as follow: *"We drive high performance to achieve results, our people are our strength, we are obsessed with the customer, we have and African heartbeat" (Absa, Annual Reports)*

Strategic objectives: Absa' strategic objectives are as follow :"*Growing our portfolio while contributing to the growth of the markets, we serve Reducing costs by creating a more efficient and effective organisation, delivering top, sustainable returns that maximise long-term value*".

Achieving growth is based on priorities such as to restore, to innovate and to empower and is guide by three enabling capabilities such as to scale, to grow and to shape.

Source: Absa Annual Report (2019)

Figure 6.1: Absa Strategic goals

Followings are the types of strategies that Absa applied to meet over strategy goals of the institution namely differentiation, market positioning".

Differentiation

Absa bank in the only South African bank that holds a money and banking museum that contains collection of South African numismatic items in the world. Absa bank offers retrenchment benefit to customers that have been retrenched depending on the account type such as Gold value Bundle and premium banking. As a conventional bank, Absa bank has received an international and valuable recognition in offering Islamic banking products and services following the Sahri'ah compliant banking requirements.

Market Positioning

Absa bank has position itself in the banking industry in South Africa through the following aspects:

Offering specific financial products

Absa bank believes that by giving local producers an enabling environment, better economic conditions are guaranteed. AgriBusiness is one of the financial products and services that Absa offers to farmers to run their agriculture business with good productivity (Absa, 2019). Absa bank then makes the following services available for all local farmers in South Africa:

- Partners for growth with whom farmers can collaborate to develop strong economic strategies. E.g.: Agrista, John Deere Financial, Agbiz
- Smart insights and previsions that help producers to increase their business over time. E.g., Agri trends, Agri annual reports, Agriad hoc reports, media articles on pork, beef, blueberry, avocado and so on
- Community connect where farmers network with other industry' colleagues at different events.

Absa bank equally offers products and services as solutions to meet and improve requirements of franchisor and franchisee. The approach consists of precisely reduce operational expenses and risks in addition to increasing banking values.

Offering Business Management Tactics

Absa bank offers tailored banking services to assist business efficiently which ever stage they are:

- Starting the business through assistance, training and loans
- Managing the business through merchant services, loans and insurance
- Grow the business through business loans, global openness, forex and international trade
- Sustain the business through strong management and governance following specific documents and templates such as the contract of employment and personal records, the maintenance and office supplies request as well as cash flow, labour cost and product costing from various department in the organisation.

Offering business management solutions

Absa bank offers Microsoft office 365 to their business banking customers to efficiently meet business goals. The solution provides businesses with accessibility and mobility that help accessing emails, files, documents and meetings (Absa, 2019). Safety from external threats

using built-in privacy and compliance tools through **s**afeguard ensure productivity, business updates and resource allocation. Businesses equally have accessible through cloud-based application. In addition to the above main features, secondary features and benefits are as follow:

- Safe communication using encrypted email.
- Install Microsoft office 365 on up to five mobile services.
- Automatic office and exchange version updates.
- Latest version of word, Excel, PowerPoint and so on.
- Email communication using outlook and exchange.
- Allow online meetings and calling using Microsoft teams.

Besides using Microsoft Office 365 as the principal operating system, Absa also offers an online management system to automatically run and mange small businesses. The management solution is characterised by one-stop solution, unlimited users' access and is cloud-based with unlimited data storage. One-stop solution generates quotes and invoices, payroll, income and expenses all in only one system. Unlimited number of users to be connected to the system with limited access to the core functionality depending on the role in the organisation. Cloud-based means that connectivity from anywhere at any time from any smart device such mobile phone, tablets and so on. Unlimited data storage is automatically associated by the cloud-based functionalities (Absa, 2019). The use of management solution allows to enquire financial position in the business sector at a glance, easily manage business partners, generate accounting entries from the sub-ledger, automatically generate financial statements each fiscal year such as income statement and balance sheet, generate staff payslip and payroll schedules to comply to the SARS requirements as well as generating VAT report to serve for SARS VAT Returns.

Customer and Product -centric

Absa Bank has adopted the product-centric strategic approach because banking solutions are defined based on the product offered. The combination of the product and the customer recently raised since needs of digital customers quickly change over a short period necessitating an appropriate product and services. Followings are example of banking products tailored to the digital customers.

Accounts: Different types of accounts such as premium banking, gold and flexi accounts are created to fulfil specific customer needs.

Credit cards: Customers have a choice between a premium banking, gold and flexi core credit cards.

Youth, Student & Graduates accounts: The MegaU, student and graduate account are designed to suit youth, students and graduates compared to senior people.

Islamic Banking: ABSA offers the Islamic banking solutions such as Islamic savings, Islamic premium banking, Islamic gold and flexi value bundles to cover specific needs of Islamic people and customers.

International banking: ABSA equally satisfies international banking transactions through business solutions such as multi-currency cash passport, bank draft, western union and MoneyGram.

ABSA Rewards: Absa bank has defined rewards solutions such as Aba rewards, card reward from partners and exchange for shopping vouchers as a form of customer care.

Change-driven leadership

Digital leaders applied value creation through the higher standards of business honesty and ethical behaviour in order to be and exemplary leadership for the stakeholders. Leaders are thus responsible and accountable for the delivery of sustainable values as established by the governance. It is for them to make sure that business measures are fully implemented followings the vision and the mission of the institution. Since digital era is characterised by constant market change, leaders at Absa drive delivery of stakeholder value creation achieve effective leadership, well-structure governance, efficient risk management and incentive measure for customer satisfaction.

Security-driven Strategy

Change comes with its downside especially the security issues forcing people and businesses to manage them all. At Absa, customer protection is one of the value creations that constitutes a solid bottom line to improve lending activities. The use of convenient and specific business models driven by the internal and the market change allow to manage and control business securities. Market drivers such as competition and technological change are at the origin of cyber-attacks that compromise business security. That is the reason why the growth strategy at Absa includes the dynamic of security matters as explained in the above section.

Market segmentation

As one of the powerful banks in South Africa, Absa bank has segmented the financial market in which they operate by classifying customer based on criteria such as personal, private, retail and Business banking, corporate and investment as well as wealth, Investment Management and Insurance. The organisational structure at Absa shows market segmentation based on the main products and services offered, the geographic presence and the strategic goals adopted in that specific geographic area as indicated in table 6.1 below.

Table 6.1: Market Segmentation – Absa Bank

Market Segment	**Products/Services**	**Geographical presence**	**Specific Strategies**
Retail and business banking (RBB)	Universal offering across retail, enterprise and commercial banking	South Africa	Market-facing culture New customer acquisition Drive cost efficiencies Embed digital in every business
Corporate and Investment Bank (CIB)	Specialist solutions across corporate and transactional and investment banking, financing, risk management and advisory P/S	South Africa and across Africa	Increase share of wallet in current business Target new growth
Absa Regional Operations (ARO)	Complete suite of RBB and CIB	Across Africa	Grow share and low-cost digital platforms Optimise current portfolio
Wealth, Investment management and Insurance (WIMI)	Advice-led investment, credit and banking solutions Insurance offerings	South Africa and across Africa	Digitally enabled-to-end insurance Deepen integration with RBB Focus on ARO by optimising returns

Source: Absa – Annual Reports (2019)

Additionally, bank accounts are classified from everyday accounts to the account for seniors. Table 105 above displays all account types offered by Absa bank to the South African Market. Everyday Banking comprises basic accounts such as transact and Flexi Account.

Absa bank makes a distinction between transact and flexi account with full ATM access or not depending on the customer' monthly income. Other accounts benefit from best overdraft interest rate, access to international banking options and the retrenchment and disability incentives are classified per lifestyle namely gold value bundle, premium and private banking. Youth and student accounts can be classified as MegaU, Islamic youth (Absa, 2019). Student silver and gold graduate depending on the age and the access to kids' activities, gym centre and credit before first salary.

6.2.2 Digital strategies at FNB bank

FNB strategic mission is "At FNB we are always looking for ways to add value to our customers' lives by making their money go further".

Vision: Living the spirit of Ubuntu

Mission: FNB has defined its mission as follow: "*We actively encourage our people to act as entrepreneurs,* w*e took steps to reinforce our owner-manager culture to boost innovation,* w*e are taking a more holistic approach to leadership development,* m*aking people more aware of the risks and fraud associated with banking.*" (FNB Annual Reports, 2019)

Strategic objectives: FNB' strategic is about: "*Improve diversification; Grow the client franchise businesses, improve margins,* r*educe the contribution from trading activities and, Cost attainment*".

Detailed strategic objectives are as follow: "*Grow and retain core transactional accounts, provide market-leading digital platforms to deliver cost-effective and innovative propositions to its customers, use its deep customer relationships and sophisticated data analytics to effectively cross-sell and up-sell a broad range of financial services products, apply disciplined origination strategies, provide innovative savings products to grow its retail deposit franchise and right-size its physical infrastructure to achieve efficiencies*"(FNB Annual Reports, 2019).

Differentiation

FNB bank offers a reward to his new and existing customer through use of FNB connect SIM that consists of offering free data, calls and SMSs depending on the bank account. FNB connect SIM is a package that contains the option of prepaid, top up and PostPaid to suit all customer's

needs. The FNB free connect option is linked to others FNB products namely inContact and Cellphone banking. This approach allows FNB customers to remain connected in the FNB ecosystem and be selective across the industry. FNB bank sells smart devices with up-to-date requirements allowing customers to pay in reasonable instalments (FNB, 2019). In order to support customer in short-term saving and long-term investing, FNB offers financial planning to help customers achieving their future goals such as child's education, retirement and estate – legacy planning. For every banking transaction, FNB has the option of learning about banking that offers practical advice and guidelines that teach all customers and the public about how to be financially smart. Customers thus learn about saving and investing, budgeting, insuring and understanding credit management.

Market Positioning

"We are pleased to see that our investment in growth initiatives over the last few years continues to pay-off. More importantly, our platform is well-positioned for future growth despite the challenging macroeconomic conditions and competitive climate in which we trade across the nine countries said the Jacque Celiers the FNB CEO on the 12th of March 2019. As reported by the Africa Annual Survey run by Brand Finance in 2019, FNB was titled as the most valuable banking brand for the second year considering the growing rate of 20% since 2018. Additionally, Faye Mfikwe, the FNB Chief Marketing Officer concluded that: "Recognising our customer needs through deep-rooted insights help us create integrated, helpful and digitally customised financial solutions that has positioned us a market leader within the industry. Through a combination of business strategies and financial performance, we have been able to maintain our market position which has helped future proof our offerings for our customers in the future."

Customer and Product -centric

FNB bank uses multiples channels of communication such as FNB official website, Twitter, Facebook, and LinkedIn to optimise customer satisfaction. FNB has adopted a strategic approach based on the customers to give them continuous satisfaction and be ahead of their expectations. On the FNB portal, there is an option titled "Your opinion matters to us!" allowing customers to give their feedback about FNB in general and about service delivery. Customer feedbacks are resumed in four groups as follow:

- Call us: This option allows a customer to call for himself or for his business and thus select the related products from the lift of products offered by the bank.

- Compliments: This option allows FNB and other banks' customers to tell about what they like at FNB following the offered products
- Queries: This option allows FNB and other banks' customers to let the bank know about their queries or suggestions according to the products offered by the bank.
- Complaints: This option allows FNB and other banks' customers to let the bank know about what FNB failed to do on a specific product offered per country.

Such communication channel had given opportunity to FNB to improve in all aspect of their business and thus meet customer satisfaction all the time. By offering a large spectre of financial products such as banking, insurance, FNB legal, Lotto Powerball and so on, FNB ensure full satisfaction of customers. As creative strategy, FNB starts a relationship with Innoviate Timeline business partner to enhance their customer-centred campaigns for any new product development. As a result, an impressive amount of FNB card renewal exceeding the target metric on all levels have been met besides additional benefits such as Petro card, eBucks, insurance packages, super savers, Email of statements and newsletter (Innoviate Timeline, 2016). Additionally, direct mail piece, personalised email and personalised microsite.

Change-driven leadership

The use of smart technologies into the Internet of Things has improving customer experience through use of social medias such as Facebook, LinkedIn and Twitter. FNB has been using these channels to improve communication with customers and update their banking profile and portal accordingly.

FNB now put in place estate and legacy planning to help customers managing their short as well as long-term wishes through definition of a will, executor and guardian of your child if something must happen. FNB bank has recently established a global account allowing customers to hold money in any global currency that they want in South Africa. This process allows to transact in foreign currency while limiting the impact of inflation and currency rate variance on their revenues and expenses.

Security-driven Strategy

As part of the security achievement, FNB has developed financial solution platform to help customers to optimise their financial wellbeing through harmless big data management. At the data impact award hosted in New York, FNB won the "international data anywhere" in acknowledgement of leveraging big data to offer secure platform while enabling customer satisfaction (LinkedIn, 2019). FNB bank has a banking option about security centre that

informs users about latest scams and how to avoid them by reading security booklet that tells about all types of frauds, document and contacts for fraud reporting and how to protect yourself. Additionally, cross-channel authentication, step-up authentication for third party wallets and tokenised card details are the latest smart technologies and techniques to design safe digital payment solutions.

Data-driven Strategy

From master data to transactional data, analytics and big data management constitutes the building blocks of surviving in the current era of continuous transformation leaded by the Internet of Things. Data has become one of the critical assets now represented in the balance sheet compared to before. This suggests that bank performance relies on a good data asset management. The use of big data generates voluminous analytics improving data analysis. Master data management especially customer data should be managed with care to avoid disclosure of data privacy and security challenges (FNB, 2019). Good data management allows to easily detect fraud and to prevent data breaches from multiple cyber-attack sources. Organisations have reviewed their organigram to includes specific departments that will effectively monitor analytics and big data management. Each chief of department must continuously ensure that business strategies defined by the top management reach all lower levels under its command. For instance, the main strategy is defined by the steer committee with the CEO and the CEO informs all departments such as the department of data systems strategies and the department of analytics strategies. The head of department further share the new strategies with the chief operating officers for implementation.

Market segmentation

FNB bank has segmented it financial market in three namely retail, commercial, corporate and institutional and the rest of Africa. The retail segment includes subsegments such as consumers, premium and DirectAxis. The commercial segments comprise the small medium enterprises as business and the commercial segment. Each of the segment offers business activities related to banking transactions, lending, investment and insurance. FNB bank created products that were tailored according to the market segment namely bank for Me, bank for My Business, bank for Corporates and private banking.

Bank for Me: It includes specific bank debit card for gold, premier, petro card, private clients and private wealth customers depending on their annual income range. Short-term saving account are ranged as standard saving account, Money on call, 7-day notice and Money

Maximiser depending on the minimum opening balance to improve customers' capabilities to carry out financial planning.

Bank for My Business: FNB bank uses the criteria of turnover for businesses to classify business customers' status such as Business Zero, Gold Business and Platinum business depending on the range of the turnover per annum.

Bank for Data: FNB bank has a product called "Free Connect" that consists of offering free monthly allocations of data calls and SMSs to all qualifying FNB accounts that has an FNB connect SIM. Data allocation level depends on the FNB card such as the Easy smart option, the gold fusion, the premier, the private clients and the private wealth that can receive a minimum of R80 data, R30 for callas and R30 for SMSs.

6.2.3 Digital Strategies at Nedbank

Nedbank delivers growth and value through strategic response to the difficult macro environment.

Vision: One of the Nedbank vision is: "To be Africa's most admired bank" (Nedbank, 2019) by the staff, shareholders, regulators as well as the communities.

Mission: Nedbank mission is to deliver long-term value and sustainability to all stakeholders. Such mission evolves around the followings: "*Maintain good level of BBBEE, digitalised enabled clients, leadership and structural changes, good progress on staff transformation, focus on compliance and sustainable banking practices…*" (Nedbank Annual Report, 2019)

Strategic objectives: the main objective of Nedbank is delivering growth and value. The detailed strategies applied are as follow: "Client-centred innovation, *growing our transactional banking franchise, define strategic portfolio Titt, optimise and invest, Pan-African banking network*" (Nedbank Annual Report, 2019).

Figure 6.2 shows that Nedbank strives to create strategic enablers for client experiences and increasing market share.

Source: Nedbank 2018 Annual Report (2020)

Figure 6.2: Strategic enablers for client experiences

Differentiation

Nedbank applies several strategical principles to differentiate itself from other banks. Nedbank seeks to be a market leadership in commercial-property finance and renewable-energy funding as well as driving industry expertise in infrastructure, telecoms, energy, oil and gas. They develop solid corporate banking partnerships to improved digital offerings and thus become leader in the market in developing customer-centred innovations. Above all, Nedbank constantly create efficiencies and exponential technologies through optimisation of business processes. Nedbank use cookies that are small text file to personalise and monitor how often a specific webpage is used or not and to update the website to meet customer' needs. Nedbank is the first South African bank to deliver a renewable energy bond. Additionally, Nedbank Corporate and investment banking (CIB) venture capital and aerobatics won the venture capital start-up category award due to the effective contribution to South Africa farming industry. Aerobatics put in place drone technology to evaluate tree harvest health, analysing crops to distinguish pests and thus cure diseases at early stage.

Education and unemployment are the most critical weaknesses that affect the overall economy in South Africa. Nedbank promotes good education career through matric results competition and business solutions. Matric results competition allows Nedbank offers a price of R50 000 (Fifty thousand Rand) tuition fees for the Matric winners. Business solutions help Business customers take benefit from the Nedbank accounting, investment and payroll solutions and support to run their business efficiently. Nedbank issues American express cards under license

in South Africa as well as foreign currency account to easy foreign transactions while being in South Africa. Nedbank equally allow its customers to play Lotto as well as Powerball using Nedbank mobile banking channels. Most importantly, Nedbank has created an online chat between the customer and a virtual assistant named HeyNed to answer customers' concerns regarding other services offerings such as list of restaurants, accommodations, flights, plumbers and so on in your area of location. Despite its financial side, Nedbank invests on economic insights research in South Africa and run weekly and monthly publication on his website. It consists of highlighting economic points that affect financial stability in the long run and thus guide financial forecasts. Research topics are about guides to the economy, mining production manufacturing product, Nedbank capital expenditure project listing and son on. For instance, on the economic commentary, Nedbank wrote an article on the state of the nation address (SONA) 2020 in which the electricity crisis, fiscal discipline and other structural reforms required where established. Nedbank equally publishes daily exchange rate, quarterly and annual forecasts.

Market Positioning

Nedbank offers affordable interest rate for loan, foreign exchange and credit facilities in addition to monthly fees on all banking transactions. Nedbank has introduced a new application called money App that allows a customer to open an account instantly, scan to pay, to see awaiting loan offer and most importantly to freeze and unfreeze bank card when required.

Since 2005, Nedbank was the first South African bank adopting equator principles stipulating a set of performance and sustainability standards and guidelines administered by the international finance corporation. Nedbank launched the first ever green index as a benchmark for green conscious investors and equally offers innovative solutions for sustainable development. Nedbank offers carbon finance product in which they assist customers in measuring, reducing and counteracting greenhouse gas emissions and applying carbon strategies at large. Nedbank was awarded bank of the year in 2015 by the banker and got the price of the best banking CEO of the year 2018.

Customer and Product -centric

Nedbank gives opportunity to all customers to provide their feedback on services rendered and any suggestions from customers to improve customer satisfaction. Following the international and national tax regulations, Nedbank requires customer information and status to fulfil with the obligation. New products are designed by the bank and are published on the bank website

or through social medias to meet customer satisfaction. Example of how to show an account or hide in such a way that it is excluded from the total balance.

Change-driven leadership

Mastering the banking leadership is all about developing methods to achieve and improve customer needs. Nedbank customers can choose to show or hide an account from the total balance. Such critical changes are the keys of effective leadership in alignment to digital strategies. Financial institutions now offer both innovative banking solutions and payment solutions to support businesses and corporates.

Security-driven Strategy

Nedbank has developed a knowledge-based strategy whereby customers know what they want and when they want to do it and most importantly how to protect themselves. Nedbank card settings option allows customers to block and replace the card, freeze and unfreeze the card and also to turn on or off the option of using online purchases and the tap and go functionalities. The use of fingerprint to log in to any bank application also characterise the level of security applied at the bank. All products designed by the bank are first security-proven before commercialisation. The INETCO insight software that runs real time transaction automatically detects payment fraud before it negatively affects the customer. IP address and firewalls are designed in the system architecture to block suspicious transactions.

Market segmentation

Nedbank offers a wide range of products linked to personal and to business profile following segmentation of the South African financial market. Nedbank has divided its financial market in several segments such as Nedbank corporate and investment banking (CIB), Nedbank retail and business banking (RBB), Nedbank wealth and the centre besides Nedbank rest of Africa as explained on Table 6.2 below. Business in the rest of Africa mostly includes unlocking long-term value in core business across the SADC region, the East, Central and West region. Nedbank centre contains various functional units that provide support services to customers and all stakeholders where required.

Table 6.2: Nedbank Market segmentation

Market Segment	Main Activities	Detailed Activities
Nedbank Corporate and Investment Banking (CIB)	A powerful, scalable client-facing wholesale business	Continue focus on revenue generation synergies from integration. Convert strong pipeline in investment banking business. Improve trading capabilities across all asset classes. Utilise alliance network across Africa to identify opportunities and drive growth.
Nedbank Retail and Business banking (RBB)	Building a sustainable, profitable businesses through the cycle	Quality acquisitions and selective asset origination. Continued prudent risk management. Ongoing active cost optimisation to balance investment needs.
Nedbank Wealth	Slower growth in tougher times	Maintain performance in Wealth and Asset Management. Investing in new products and systems Unlock further values. Enhance client propositions and digital functionality.

Source: Nedbank Annual Reports (2019)

Besides standard market segmentation, Nedbank offers merchant payment solutions, business registration service, point of sales solutions and Platinum fixed deposit and invest products for customer with business profile. Customers with agricultural profile benefit from Livestock cover, seed finances and the import and export services. Additionally, Nedbank offers medical industry solutions to customers who own medical practice.

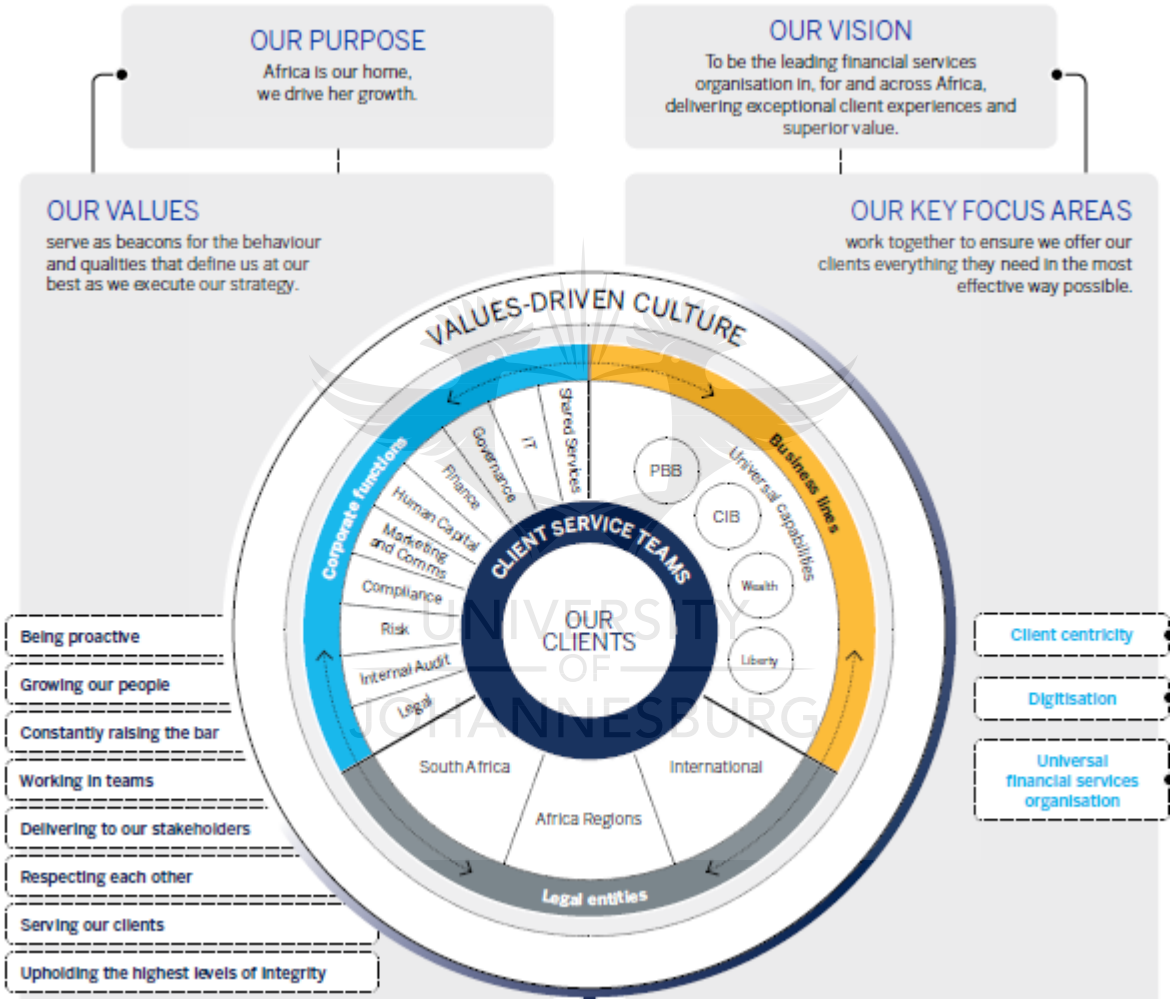
6.2.4 Digital strategies at Standard bank

Standard bank has been implementing digital strategies that help to manage change and thus respond to the operating context, all stakeholders' needs and the related material issues while working on three focus areas namely client centricity, digitisation and integrated group.

Vision: Standard Bank' vision is as follow: "Africa is our home; we drive her growth".

Mission: Standard bank has the followings as mission: "*To be the leading financial services organisation in, for and across Africa, delivering exceptional client experiences and superior value*"

Strategy objectives: The main strategy objective followed at Standard bank is as follow: "*Our strategy is centred on our commitment to Africa and directs our growth and evolution to the shared benefits of our clients, our people and all our stakeholders. It allows us to lead with purpose, to build a better business, and to position our footprint and platform for the future*".



Source: Standard Bank Annual Reports (2019)

Figure 6.3: Standard bank Digital Strategies

Differentiation

Standard bank innovated on virtual banking through use of wallets namely wechat, shyft global, instant money and snapscan. The bank provides Shari'ah banking transactions to customer looking for products and services that comply with the Shari'ah principles. One of the

principles of the Shari'ah stipulates that customer funds should be separated from traditional bank 'funding activities. STD bank offers affordable foreign exchange rates as well as forex outlets allowing customers to be at ease while using bank card abroad, requesting foreign notes and direct delivery or using shift card for shift global wallet. Additionally, international payments and moneygram can be done from South Africa to the outside and vice versa. STD bank offer Bizconnect functionalities to support customers to grow their business efficiently. Following the UN principles for responsible banking, STD bank has tailored its business strategies accordingly. Hence the vision of growing Africa.

Market Positioning

Standard bank offers shari'ah-orientated products and services compared to many banks in south Africa. Investment solution is offered to the customers to ensure their international investment portfolio as well as fiduciary solutions to protect their assets. International affairs provide International fiduciary services that involve leaving a legacy, built a solid framework, wealth preservation and asset protection. STDB offers investment solutions website only accessible by international retails, individuals or institutional investors for services related to stockbroking services, structured products, investment funds and discretionary portfolio. From borderless banking to bank being presence in almost every sectors of the economy drive business opportunities across South Africa and Africa as a whole. Therefore, STD bank connect businesses with the right partner to optimise productivity and economic performance in mining, oil and gas, consumer, real estate, telecommunications, media and technology. STD bank helps business to implement BEE requirements in the BEE sector to close the gap of inequality in the country. STD Bank connects business customers to the right partners in the financial institutions. STD bank supports economic growth through successful delivery of power and infrastructure in the Power and infrastructure sector and further to the public sector.

Customer and Product -centric

STD bank has developed capabilities to strengthen relationship with its customer through partnership in other economic sectors. Financial advisors are available to direct and assist customers to maximise the profitability. New digital products are designed to meet both customer expectations and satisfaction.

Data-driven Strategies

STD bank acknowledged the importance of data in driving profitability since digital transformation at the corporate level is effective. Considering data sensitivity and security, the

approach of data ownership has developed the sense of belongings to the personnel leading to efficient data governance. Data accuracy is crucial in generating significative data analytics through artificial and business intelligence in addition to information management.

Change-driven leadership

Digital disruption has forced bank to defined flexible business strategies to adapt in the new environment full of continuous change. Besides creating new digital products and services, STD bank incessantly upgrade existing products to meet client satisfaction. The bank has the responsibility to accompanying all stakeholders through the vision of growing Africa while focus on sustainable development. STD bank is now partnering with Fintech to offer secure financial solutions such as utility and technology providers besides enriching payment proficiencies at low cost. The bank equally strives to educate consumers on new products and services to increase customer experience.

Security-driven Strategy

Once again, surviving in this dynamic world requires a sound security system since technological innovation also come with online attacks. At STD bank security measures start with data quality and protection pertaining to all stakeholders. There is an active security centre that researches and informs customers about potential scam risks and how to avoid them. Standard Bank complies with the sustainability development Goals (SBG)'s strategy as part of the social security targeted by businesses and international norms and standards.

Market segmentation

Standard bank has divided his financial market into main segments namely personal and business banking (PBB), corporate and investment banking (CIB), Corporate and Investment Banking (CIB), Wealth Management and Liberty as displayed on table 6.3 below.

Table 6.3: Standard Bank Market Segmentation

Market Segments	Responsibilities
Personal and Business Banking (PBB)	Financial services to individual customer and small to medium-sized enterprises. Enable customers to take control of their financial transactions through face-to-face interaction or digitally according to their preferences.

Corporate and Investment Banking (CIB)	Serve a wide range of requirements for banking, finance, trading, investment, risk management and advisor services. Deliver comprehensive range to investment banking, global markets and global transactional products and service offerings.
Wealth	Financial planning and modelling Integrated fiduciary, custody and trust as well as estates administration services. Investment services including global asset management.
Liberty	Short-and long-term insurance products comprising simple and complex products

Source: Standard Bank Annual Reports (2019)

Furthermore, Standard bank classify its customers through creation of different types of bank account such as savings, business, personal, international, wealth, investment and attorneys accounts. Among international account, subdivisions are done depending on the number of currencies used. There is an optimum, a platinum optimum, seafarer and call bank account.

6.3 Digital Technologic Innovation

South African banks have embraced digital technology innovation through development of specific platform for business mobility and continuous improvement. From formal to informal markets, payment technologies and processes are continuously evolving. Digital technologic innovations is a combination of the Internet of Things, big data, analytics, cloud computing, smart devices, online transactions, social networks, artificial intelligence and robo-advisors. Developing business model to transform the business process forms part of the innovation. Banks invest in digital technologies to optimise their results and remain competitive through strong market positioning.

6.3.1 Technological Innovation at Absa Bank

Internet of Things

In South Africa there are few companies known as internet providers namely Huawei's cloudFabric, MTN, Telkom, BCX, Microsoft, IBM and Dell EMC (Web brainstorm, 2019). They deliver faster mobile network to ensure continuous connectivity for businesses and houses. Network infrastructure is evolving every day to meet accessibility, speed and flexibility as required by the customers. Internet connectivity is the building blocks of online as well as

cellphone banking. Online banking functionality allow customers to transact, monitor the banking profile, manage all bank accounts (Transact, Flexi, gold, Islamic and so forth), complete payments, control online security information and manage savings and investments.

Banking Security

In order to meet customer satisfaction, Absa bank innovated in the field of security by making Absa Antivirus named Trend Micro Maximum Security 2020 available to his customers to fight against cyber-attacks. Furthermore, Absa has equally developed a software called Jitter for anti-card skimming that read disrupted signal as early stage during ATM transactions and stop them. It detects illegal skimming device that has as aim to copy data from the banking cards. At Absa bank, there is a free digital fraud warranty on all digital transactions as well as an advanced encryption software that works on upgraded browsers. For better results, the advanced encryption software is aligned to internationally accepted standards of encryption technology. Absa bank holds a 3D secure call centre that monitor online shopping using 3D secure technology. Absa has a safety measure called CAPTCHA (Computer Automated Public Turning test to tell Computers and Human Apart) that allows to distinguish human against machines or robot during online banking logon. It happens that people share banking credentials with mutual consent. Absa innovated knowledge-based identification that consists of recognising customer through their voice biometrics.

Friendly Green - Renewable Energy

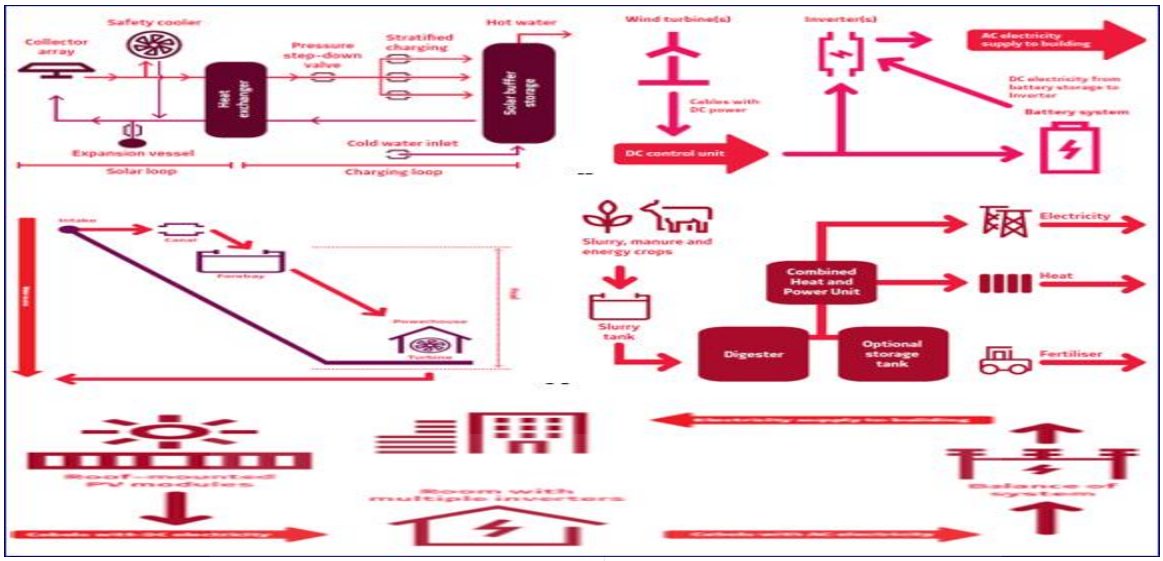
Most importantly, Absa bank has invested in the renewable energy as the appropriate sources of energy for future generations and thus assist customers in using renewable energy resources such as solar, hydropower, wind and bioenergy to generate electricity in their homes or businesses.

Solar Power: Solar power helps to provide clean energy for home and industries and thus reduce electricity costs and pollution. Solar photovoltaic (PV): PV systems use the sun as electric generation source during the day using panels. Solar PV works as follow.

Hydropower: Hydropower systems allow to generate electricity through a moving stream of water.

Wind Power: Wind power systems allows to generate electricity from battery storage to inverter.

Bioenergy: Bioenergy is collected from organic matter or biological sources from plants to food waste that help to produce biomass, biofuels, biogas and biodiesel.



Source: Absa Bank Annual Reports

Figure 6.4: Absa Renewable Energy

Smart Devices

In order to be fully digital, Absa bank has the following devices to optimise payments for business as well as individuals' needs where required.

Table 6.4: Absa Smart Device Solutions

Banking Device Solutions	Key features
Sending Payments	Terminal device payments
CashSend Plus	Payment can be done using business cheque or savings account.
SWIFT Payments	Risk-free and secure form of payment.
Business Integrator International	Trade finance and cash management. Cross border outward transfers in foreign currency and local Rand.
Receiving Payments	Electronic Fund Transfer (EFT) transactions.
SmartPay	Point of Sales (POS) device.
Stand-alone desktop	Device can be fixed or portable to enable payments on the move.

Integrated host system	Ability to integrate to all card present payment service providers.
eCommerce solutions	Virtual shop never closes and is accessible worldwide
NAEDO - Non-Authenticated Early Debit Order	Improve collection funds from the customers. Complete credit tracking plus reports to simplify reconciliation.
Electronic funds transfer	EFT debit order service available online.
AEDO	Improve collections and reduce disputes with customers. Transactional reporting and maintenance available through convenient channels.
Batchlink	Process recurring transactions via host to host or payment service provider.

Source : Absa Africa (2019)

Cash Device Solutions have specific key features.

Manual Cash Banking: Cash withdrawal at ATM and Payroll cash payment; Cash Accepting Devices: Provides printed receipt at every deposit; Cash Self Service: Complete, track and monitor online cash deposits; Cash-in-transit: Secure cash transportation from customers' premises to Absa processing centre; Cash Insurance: Reduce financial impact on customers when suffering violent crime occurrences resulting in the loss of cash.

Absa bank offers SmartPay devices that helps small and medium businesses to provide instant payment services. SmartPay terminal devices have the following features:

- Receives chip, Pin and magnetic strip credit and debit cards (MasterCard, UnionPay and visa).
- Receives tap 'n go credit and debit cards (MasterCard, UnionPay and visa).
- Can provide digital receipt to cardholders via email and SMS at no cost.
- Can resend receipts via the SmartPay merchant portal.
- Can add a reference number to all transaction to ease bank reconciliation.

Data Analytics

Absa bank has a data security manager that check and make sure that client 'business comply with the payment card industry data security standards. In order to optimise business profitability, Absa bank has made available operating as well as business management

solutions to clean, analyse and process business data. The use of Microsoft office 365 improve documents, emails, files and shard documents.

Artificial intelligence

Absa bank continuously improve technological application in precision farming in addition to the use of Artificial Intelligence. Procurement portal host systems that help to grow such supply chain network and run businesses such as Microsoft office 365 and SMEasy.

Bio Security Measures

Following the AgriBusiness products and services that Absa offers in the South African market, the emphasis is done biosecurity to protect the environment as well as people against epidemies. The AgriBusiness Centre of excellence Team at Absa contains senior economist and economist to assist and provide producer clients with required biosecurity techniques to optimise productivity.

Cyber Security

Outsiders have developed different kinds of frauds and crimes to steal money from people and infiltrate their personal information and data. Absa bank has listed potential scam that can harm customers' banking transactions.

Phishing, Vishing, Smishing SIM Card and 419 frauds

Absa has defined key security measures and techniques to ensure online banking security and thus limit hacks, breaches and cyber-attacks. The overall cyber security at Absa bank is managed under the followings criteria:

Security measures

Online security mechanisms are grouped as follow:

Banking App: Specific security techniques are successfully done through Absa banking App downloaded in the smartphone as explained below:

- Verification device and messages: during online banking, a verification message is sent to the App on the smartphone. This practice equally helps to avoid SIM-swap fraud.
- Stop and replace banking cards: The Absa banking App allows to take control of the card movement through deactivation for example when the card has been lost or stolen.
- Temporary lock: Banking cards can be lock and unlock when necessary for ATM and in-store transactions as well as online purchases.

- Manage limits: Expenses amount can be controlled by setting up daily and monthly limits.
- Click to call always call the fraud centre when suspecting unauthorised access to the banking accounts.
- Digital fraud warranty: Absa bank offers free digital fraud warranty to cover all digital transactions in case of unusual and illegal practices.

Online security measures: During online banking transactions, the following security measures should be considered:

- Virtual keypad PIN input: It is a virtual keypad that allows to type in the PIN to avoid key-loggers to easily catch the PIN like on the normal keyboard.
- SMS alerts of Absa online logon activity
- Free antivirus software
- A personalised welcome message known as Absa's SurePhrase that is difficult for fraudsters to duplicate.
- Many firewalls to restrict online access from outsiders.
- Advanced encryption software that goes in hands with the updated browser
- Website timeout and automatic logout
- Password failure 3 times lead to the Absa account suspension.
- 3D Secure technology that helps customers to safely shop online in addition to the on-time-PIN (OTP)
- IIP holds help in the event of immediate interbank payment with two SMS during creation and processing to ensure security since the payment cannot be reversed.
- CAPTCHA (Computer Automated Public Turning test to tell Computers and Human Apart): This safety measures is to differentiate human against computer-generated attempt.

In addition to the Absa banking App and security measures, the followings measures are also put in practice to fight against fraud. Phishing and skimming.

- Chip & PIN: Chip-and-PIN can be a debit, cheque and credit card that contains chip with a micro-trip that make the card to be impossible to counterfeit. The unique PIN associated with the card adds another layer of safety transaction at the ATM for instance and can only be rest at the Absa branch.

- ATM: Absa applies anti-card skimming software that send early signals of illegal practices such as data copy from the card.
- Voice biometrics: This security option consists of voice recognition during telephonic conversation with customers.
- DebiCheck: This measure is a debit order versification system that helps to control all transactions on the debit order.

Free antivirus: Absa bank offers free antivirus software to his customers every year to ensure transactions security to the fullest. The latest version of Absa Antivirus named Trend Micro Maximum Security 2020 is already available to all online and mobile banking application.

Updates: The updates page on the Absa website disclose latest fraud for customer to be aware of the new attacks 'tactics. Attackers have come out with new tricks that consist of sending "FICA request" to customers asking for their banking credentials. The phishing frauds look as if it comes from the legitimate organisation whereas it came from fraudsters. The followings indications are published by Absa bank to avoid being trapped:

- Always make sure the URL (Web address) starts with https.
- Absa will never request your credentials via email.
- Never click on any of the links or attachments in the email.
- In case of suspicious email, send it to Absa and delete the email after forwarding.

System Architecture

As part of the security process, system architecture at Absa bank is built with solid features such as multiple firewalls layers, cloud layer, limited endpoints and domain access, advanced encryption software, 3D secure, renewable systems, Microsoft Office 365 and one drive storage.

6.3.2 Technological Innovation at FNB Bank

Innovation

"Innovation is fundamental to the way we think. I believe that innovation is critical to FNB's success. Companies that fail to innovate will not only fall behind their competitors; they are unlikely to survive in an intensely competitive economy." Michael Jordaan, CEO of FNB (FNB, 2011). FNB bank comes up with a different product or aspiration every month to improve customer satisfaction and positioning in the banking industry in South Africa. November 2019 - FNB launched a global Entrepreneurship week to engage with township

entrepreneurs to improve local economy. FNB initiated a partnership with Fintech named Selpal to solve financial inclusion and the distribution platform. FNB published safety tips to prevent being scammed at the ATM.

January 2019 Partnership with Entertainer from Dubai to allow customers to two-for-one discounted offers at various restaurants, beauty salons, health, hotels, and health and fitness facilities. FNB launched the use of QR code payments on its bank app for consumers and merchants.

22 February 2019 - FNB deployed analytical, legal expertise and forensic to protect customers against unauthorised debit order. FNB detected debit order fraud from Procall and Mzansi and paid back the victims. FNB bank create a new product called "FNB Connect" offering free data and data transfer to eligible customers. FNB launched the new Easy account that combines medical, legal and financial advice to meet customer expectations.

05 March 2019 - FNB launched the use of Samsung Pay to secure contactless payments in payment terminal in South Africa.

Additionally, FNB continuously innovate in designing and implementing latest technologies to counter malware from invaders and sustain customer safety. Digital payment solutions such as set-up authentication for third wallets, cross-channel authentication and tokenised card work in the background to ensure that all transactions are secure before final validation as per customer request.

Internet of Things

In implementing digital banking transactions, FNB bank has developed security software based on updated browsers. This suggests that FNB bank network security programs and browsers should be compatible to be protected against internet fraudsters.

Smart Devices

Most of the products offered by FNB bank are operational on a smart device. FNB free connect, E-wallet and entertainer among many standards products and services provide by FNB are operational on smart device such as laptop, Android cell phone, smart phones and entertainer App. FNB equally sells smart devices with updated specs allowing customers to be up to date in completing their banking transactions. Below is an example of a computer device specs offered by FNB bank in South Africa - MSI: GF75 | i7-9750H | GTX1650 4GB | 8GB |17.3" FHD Gaming Notebook + Bag + Mouse + Headset (FNB, 2019):

- WOW factor: Backpack + Mouse + Headset with Camera Specs: Webcam FHD Type (30fps@720p)
- Memory: 1x 8GB DDR4-2400, 2 slots, up to 32GB, display: FHD (1920x1080) and screen size: 17.3" FHD
- Operating system and version: Window 10 with processor and Speed: Latest 9th Gen. Intel® Core™ i7 processor 9750H up to 4,5 GHz

Data Analytics

FNB bank has created a data platform named "Nav" to allow customers to self-manage their banking transactions on their portal without depending on bank' staff (Linkedin, 2019). Additionally, Nav helps customers to define smart reminders and email notifications to monitor their daily banking transactions such as credit status and expenses regardless of where they are in the world. The digitalisation process goes in hand with the transformation of organisational culture, business models as well as big data management and data analytics. Hence the need for organisations to create specific departments to handle analytics, data systems as well as master data management. At the FNB bank business, the head of analytics named Yudhvir Seetharam stated that:

> *"Organisations face a paradox when seeking to excel in analytics. They have the resources to invest in technology and talent yet lack the corporate culture and agility to use this investment to drive value. Companies that can do both are truly excellent at big data and analytics."*

Master data management is all about management of financial products, Stakeholder's, account and transactional data. Data analytics cover reports and statements that are pull out of data sources and data already consolidated during banking transactions. The followings analytics are delivered by FNB bank monthly and annually to inform about business insights. For instance, bank statements, annual reports and customer engagement analysis. Successful data management allows to improve risk management, customer experience as well as improving competitive edge. Data analytics allow to manage risk as well through planning based on periodical report analysis. Digital analytic structure at FNB bank can be designed as follow: Analytics includes bank statements and the customer engagement analysis. Data consolidation comprises data centres and cloud computing among others. Since the digitalisation is a computerised process, it requires cleansed and formatted data for data migration from master and common data sources as well as from account and transactional data.

Artificial intelligence

Artificial intelligence are automated programs that enables intelligent machine learning to deliver customer service in a timely and efficient manner. Automated Teller Machines (ATM) and electronic fund transfer (EFT) are banking transactions managed by artificial intelligence at FNB Bank in South Africa.

Cyber Security

FNB (2019) published the role of their security centre that works in making sure that customers are aware of any kind of fraud, frauds or hacking. The security centre provides security booklet, latest fraud, digital fraud option, how to protect yourself, documents and contacts as well as report fraud.

Security booklet: FNB bank has defined a Security booklet that contains, explains and gives example of fraud or attack that can happen on each bank product offered across the country. ATM, card, cheque, identity theft, email, online fraud, attack or frauds in addition to money laundering, holidays, 419, money mules and dating and romance scams are clarified to help customer to fall in trap of impostors.

Latest Scam: This FNB security page informs customers about the latest fraud in the financial market. Currently, FNB (2019) has published remote access as the recent fraud that consists of fraudsters to remotely access your banking profile in your computer through use of both sophisticated software programs and open internet access.

Protect Yourself: FNB has defined three tips for customers themselves against frauds and hackers as follow:

- Dos and don'ts of digital banking: These tips allow customer to be aware of what to do and what not to.
- Smart inContact: this option is a secure messaging system that FNB uses to send message is FNB app for the user to approve all online banking transactions.
- Security software: FNB ensure continuous compatibility between security systems and updated browser to build robust barriers against attackers.

At the corporate or institutions level, the IT department should ensure safety of the whole company against outsiders through the followings:

- "Ensure effective antivirus software on all PCs within your environment, the antivirus must be kept up to date.

- Ensure that all PCs are kept up to date in terms of security patches and updates supplied by the relevant software vendors. It is best to configure all products to do automatic security updates where possible.
- Ensure an effective solution for preventing malicious emails from entering the client network.
- An effective solution for scanning emails entering the organisation for viruses and spyware on the email gateway.
- Control or deny encrypted or password protected emails from entering the client network as this can be used to bypass the scanning controls.
- Ensure that the company network is secured with a properly configured firewall.
- If applicable, make sure your wireless network is properly secured.
- The IT team needs to appropriately restrict and monitor remote desktop access to PCs that have access to Online Banking Enterprise™.

Memory sticks are unfortunately an effective way to spread viruses and spyware, users need to understand this and ensure that they do not become infected by inserting their memory sticks into unknown or high-risk devices. Deny all executables and other installation file types from coming into the organisation via email, even if they are hidden in a compressed file." (FNB, 2018)

Digital fraud: Digital fraud is a reality that individuals as well as banks should be aware of and find the related solution. FNB bank has put in place a security centre that works daily to provide all customers with the required knowledge to face digital fraud. The following cyber-attacks forms are available on the FNB bank website to educate people about hijackers and thus simplifies the process to report the fraud back to the bank.

Identify theft: This type of digital fraud happens when a fraudster uses someone personal information such as ID, passport, email account, payslip and so on is stolen or duplicated to do banking transactions on your behalf.

Safety tips: In order to prevent identity theft, customers should always keep personal information in a safe location, check debit and credit report transaction, monitor monthly bank statements to check on unauthorised transactions and avoid responding to scam email in a regular basis.

Phishing: This form of fraud focuses on accessing user's confidential information through email request and fake website. This entails that there are phishing email and phishing website

all leading to collect personal information. Users receive emails claiming the followings as published by FNB (2019) to fool customers and hijack their personal data.

- You have been a victim of fraud and you need to login urgently.
- You have received money into your account that needs to be confirmed.
- You have done something that will result in your account being suspended unless you log in straight away.
- You have violated terms and conditions and need to login.
- You have received a payment that needs to be confirmed.

Remote access: This fraud consists of fraudster entering someone's computer using programs like TeamViewer to access his banking profile through the internet.

Safety tips: Safety tips to fight against remote access fraud are as follow:

- Never agree to install any remote access software on your computer whatever the reason.
- Never share the OTP whether for help or to unblock unknown transactions.
- Never disclose personal information such as username, password, card number and PIN

SIM swap: In this type of fraud, attackers SIM swap and porting someone's phone number to be able to receive OTP notifications and become owner of your phone number.

Safety tips:

- Always keep personal information safe
- Immediately report for fraud when you are not receiving OTP messages.
- Keep your phone on to monitor if SIM card has been swapped or not.
- Notify the bank so that your contact number is updated in the bank' system.
- Always call the customer service to make sure that your number is the same.

Vishing: In this form of fraud, the user received a call in which the individual pretends to be calling from the bank in order to extract personal information and steal the money.

Smishing: This form of fraud operates through use of SMS whereby the user is asked to disclose his personal information. Once again, the fraudster pretends to be the bank and ask the user to select a link that allow exposure of his personal information.

Safety tips: Bank users should avoid answering scam messages **and d**elete messages from unknow sources.

Lost /stolen devices: Fraudster steal people device to access their information. The user should immediately delink that number from his online banking profile. In summary, FNB bank always gives instructions to his customers on the following key points regarding safety and protection as published by FNB (2019):

- Always type FNB link www.fnb.co.za in your browser
- Never save your passwords on your browsers
- FNB will never ask for username and password
- FNB will never as for your On-Time PIN (OTP)
- FNB will never blocked your banking profile
- NEVER disclose sensitive information like username, password, card and PIN
- NEVER install software in your PC
- Never click on links in emails claiming to be from FNB

Other types of fraud

FNB bank has discovered card and ATM fraud as other types of malware that imposters use to do unauthorised banking transactions.

Card fraud: Fraudsters steal someone bank card especially credit card to perform transactions on his behalf. They can use any of the following options:

Card skimming: This type of fraud consists of duplication bank card through stealing of data inside the bank card during swiping at the shop, restaurants or petrol station. This happens when a specific unauthorised bank card reader device has been programmed to download data from the card to further duplicate the card to perform maleficent transactions.

Safety tips: The following safety tips allow to avoid and limit card skimming fraud:

- Keep sight on all transactions done with the bank card.
- Use different PIN on bank card.
- Check all transactions on the bank statements.
- Always read your bank card details after any transactions.
- Always shred your bank card details before throwing them away.

Safety tips: Always check your surroundings when processing banking transactions, cover the keypad while typing your password or PIN and use the reflector mirror to observe around you at the ATM to avoid and limit shoulder surfing fraud. In case of doubt, cancel the transaction when something became suspicious and immediately change personal information when you

have been observed. Regarding the lost or stolen cards, people must memorise your CVV number, keep PIN in mind and do not verbalise it at the ATM or in front of your pc and immediately report lost or stolen card at the bank. In case of suspicions, immediately delink the number from the online banking to limit consequences of stolen or loss card.

Document and contacts: FNB bank has made available forms such as Credit card fraud claim form, debit card fraud claim form and Dispute form in case any dispute arises from fraud or a transaction partially or wrongly completed. FNB has made available important numbers all linked to the following to urgently assist customers in case of any issue such as 24-hour single fraud line, ATM fraud, South African Police Service, lost or damaged cards and disputes.

Domain Architecture

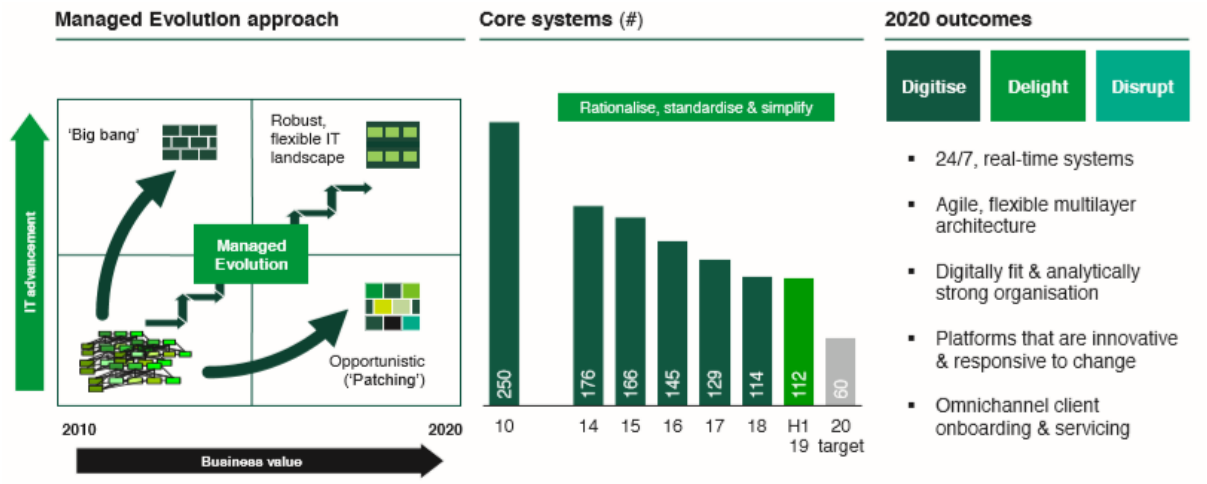
The overall domain architecture should include many other sub-systems to meet digital requirements. From camera, sensor, security to firewall systems, the domain also contains energy systems such as generators, switches, energy analyser. Disaster prevention systems such as fire alarm, flood, no electricity, all FNB applications, data and backup systems, websites as well as databases and servers compose a solid system architecture. The above systems are hosted in a specific domain holds in the cloud or in both data centre and the cloud.

6.3.3 Digital technologic Innovation at Nedbank

Innovations

Nedbank has put in place disruptive innovations methods to counter tendencies of the Fintech companies. They created an innovation centre called Launch lab where aspiring Fintech entrepreneurs meet Nedbank teams gather to discuss about their challenge and needs (Nedbank, 2018). This approach allows Nedbank to meet customer's needs and to attract new clients through development of new products and thus compete against Fintech. While Nedbank focuses on collecting new ideas from people to develop new products, the research and development department proceeds with test and simulation before launching the new digital products or services. Successful product innovations require quality control, integration with existing products or services since there is a connection between data, products and operations for quality optimisation.

Digital technologic innovation at Nedbank encompasses many enablers such as data analytics, artificial intelligence, smart devices, system architecture and cyber defence that underline innovation growth.



Source: Nedbank Limited Annual Report (2020)

Figure 6.5: Nedbank Limited – Managed evolution strategy

Smart Innovation

As well as FNB bank, Nedbank launches an innovation Lab to the employees to boost creative thinking in the field of new technologies and thus innovate new product concepts. The innovation labs offer cutting-edge technology and equipment such as whispering glass applications and broadcasting platforms besides smart boards. This approach shows that Nedbank has as primary objective stimulation of the whole staff using breakthrough thinking. Nedbank thrives to lead through innovation and creativity while following first-to-market approach to deliver on strategy. At Nedbank, new heights in the banking technology goes in hand with strategical innovation as highlighted by the CEO of Nedbank. Mike Brown stated that "Continuous innovation is a cornerstone of building any long-term sustainable business - every day we have to focus on how we can improve what we do for our clients and our bank." (Bizcommmunity, 2018). This top manager who represents the image of the financial institution believes that continuous innovation will touch a broad spectrum of areas and people and thus reinforce customer experience to products, processes technology and marketing. It is important to emphasize on the fact that marketing is done following a specific objective and goals to be met by the financial institution. This calls upon to strategy and new ways to grow business using breakthrough thinking. In order to unify business and technology, Nedbank believes that value-driven corporate culture in which employees are empowered should be valued as key enforcement to the business sustainability. Besides Microsoft Lync as IT platform, Nedbank recently expand partnership with the world' s biggest innovation platform named Plug and Play Nedbank has a department of disruption and innovation that associate

customers in both deal-flow session and pitches of the start-ups selected for the disruption agenda. The disruption agenda is all about presenting cutting-edge technology such as airware, sentience, aerobatics, dispel and so on that create disruption on business tendencies (IOL, 2018).

Nedbank allow to its customers to download and install the trustee rapport online software to protect them against fraud of all kinds. Additionally, Nedbank has innovated another bank application named "Money App" that allows scanning in order to pay and to see greenback balances among other banking transactions. This is specific for Nedbank since their aim is to remain eco-friendly while developing efficient ways of optimising online banking. One of the powerful innovations done by Nedbank is the launched of a virtual assistant called HeyNed that solve customers' issues online through display of a list of choice regarding accommodations, flights, home services, car renewal licences, restaurants and so on. For instance, if you want to know a company who can repair your swimming pool, HeyNed will provide you with a list of reputable organisations in your area that can help you. It is all about chat between HeyNed and the customer using money app. Nedbank customers that hold whether a current, savings or credit card account now have the possibility to purchase electricity, airtime and the lotto or Powerball tickets. Such innovation helps Nedbank to offer a wide range of products to the customers in the same platform to maximise their profit. Business profile can be linked to personal profile when profitable for the customers.

Greenbacks cards option is one of the products offered by Nedbank that helps customers to become green even during financial transactions. Customers are rewarded when they swipe the greenbacks card on eligible spend such as the pay-as-you-use zero free, MobiMOney, HeyNed as published by Nedbank (2020).

Source: Own Compilation

Figure 6.6: Nedbank (2020)

Internet of Things

The Internet of thing (IoT) enables execution of online banking transactions, the use of payment monitoring software and the use of smart devices to complete operational transactions. IoT allows cloud computing using cloud host that is efficient than self-host. Organisations choose between hosting their infrastructures on-premises or in a private cloud and hosting them in the cloud. Using cloud host benefits to the organisation since infrastructure investment, servers' management and maintenance fees are no more required. Storing data in a local infrastructure by means of data centre is not safe and generates additional costs like maintenance fees and purchase of new equipment. Over time, license fees are involved on the system scalability and upgrade. In the current digital transformation, it is advisable for all organisations and institutions to go for full cloud computing compared to physical, hosted and virtual production environment. Smart technologies are developed in such a way that 100% of productivity is achievable and thus avoid any possible downtime due to electricity cut or network instability. The move from hybrid or on-premises to the cloud required a well-planned and deployment of the migration plan. The cloud Africa report (2018) found that South African businesses are valuing and adopting the cloud as a platform.

Smart Devices

Nedbank has point of sales (POS) smart devices that can be set as standalone, semi-integrated, POS pocket, mobile POS and portable allowing customers to pay at any terminal.

Source: Own Compilation

Figure 6.7: Nedbank Smart devices

SmartWatch is one of the smart devices that help people to:

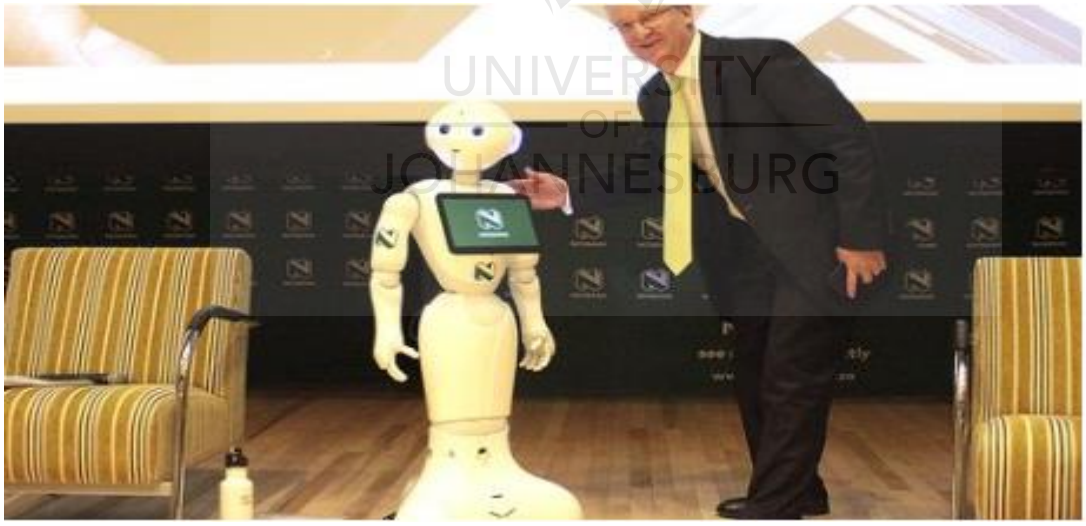
- Improve health through motivation to exercise to lose mass or keeping normal weight.

- Monitor sleep regularity and the minimum amount of sleep per day.
- Check overall body to avoid sickness, depression and anxiety.

Famous and strong smart watches are mostly made by the biggest digital organisations like Samsung, Apple and Fitbit. In South Africa, Tech watch is most used brand made in Germany that look for premium fitness and is inexpensive to remain affordable and reasonable for everyone. The Tech watch is characterised by resistant battery and is water-resistant and dustproof. It helps to take calls and displays all notifications as well as easy connection to iPhones and other Androids phone or tablets. Most importantly, it helps to measure heart rate sensor that gives warning for instant health needs and when to take a break.

Artificial intelligence

Nedbank launched its first humanoid robot named pepper as presented by Mike Brown the Nedbank's chief executive. Pepper was created by the Japanese corporation Softbank and is programmed to easily identify human voice and emotions in order to chat with customers. Nedbank has equally deployed 30 software robots to enhance banking process efficiencies. Nedbank also said that: "…had launched 46 new video bankers, 243 new intelligent depositors, 249 self-service kiosks and that 200000 statements were processed by intelligent depositors monthly. The bank would also launch its new loyalty and reward programme this year".



Source: Own Compilation

Figure 6.8: Nedbank robot

Following open banking standards, Nedbank created an application programming interface (API) platform that helps to create innovative and disruptive solutions to uplift customer experiences. New digital channels such as chabots and Robo-advisors have been launched to

improve customer expectations and satisfaction. Although artificial intelligence is seeing as the future source of unemployment, the governments should ensure that people are skilled enough to create new jobs besides repetitive tasks. the ITWeb artificial intelligence 2018 conference emphasised on the future of humanity considering the major impact of AI and robotics. Nedbank already introduced the fully programmable humanoid robot named "Pepper" to attendees of the meeting of minds: ITWeb artificial intelligence 2018 conference. This pepper robot contains machine learning algorithms and data that help him to automatically achieve tasks. This suggests that the machine-learning algorithm need to be reviewed and updated over time to increase efficiency because they cannot solve problems out of nowhere. The super Pepper enables cost and risk diminution, higher productivity on repetitive tasks and customer satisfaction. The pepper robot complies with ethical considerations especially when it deals with delivery, humanitarian settings and human sex as highlighted by ICT Insight (2019).

Cyber Security

IT revolution also exposes organisations and financial institutions data to attackers. South African public sector has adopted the strategy of cyber resilience to ensure prevention and continuity of the business after an issue occurred. The interconnection between IoT connections using cloud connectivity as well as the open webpage increase the risk of network attacks for many institutions. Organisations have developed data centre for information protection and a continuous increase of the level of data security. For some companies, data protection appliances are integrated to the application in the same architecture to ensure data protection (Dellemc, 2019). Implementing cyber security goes in hand with compliance to regulations whereby companies follow specific rules in storing or handling people and business data. The protection of personal information (PoPi) Act, the General data protection regulation (EU GPDR) and The California consumer privacy act (CCPA) are regulations for data protection. In order to ensure data security, Nedbank has established network security using cloud computing and data centre, solutions security through use of updated anti-virus and firewall as well as E-mail security. Nedbank continuously let customers to know about types of frauds such as advance fee/419 fraud, ATM, card, cheque, identity frauds in addition to malware sometimes caused by the so-called "Bring your own device".

Safety solutions: Based on the above frauds, Nedbank established the following safety methods to practice:

- Never share personal details with people

- Carefully read each OTP before validation
- Go through “Approve It” messages with focus
- Immediately alert the service provider and the bank in case of SIM swap SMS
- Alert the bank in case of doubtful transactions displaying in the statements
- Reject suspicious call from Nedbank because hackers use software to mask phone numbers to imitate Nedbank internal numbers
- Download the trustee rapport for fraud protection
- Always install sophisticated anti-virus both with the firewall software to optimise system safety
- Do not click on doubtful links and let the bank know
- Use bank-defined beneficiaries
- Always check authenticity of the cheque before fund release
- Shred personal information before throwing them away

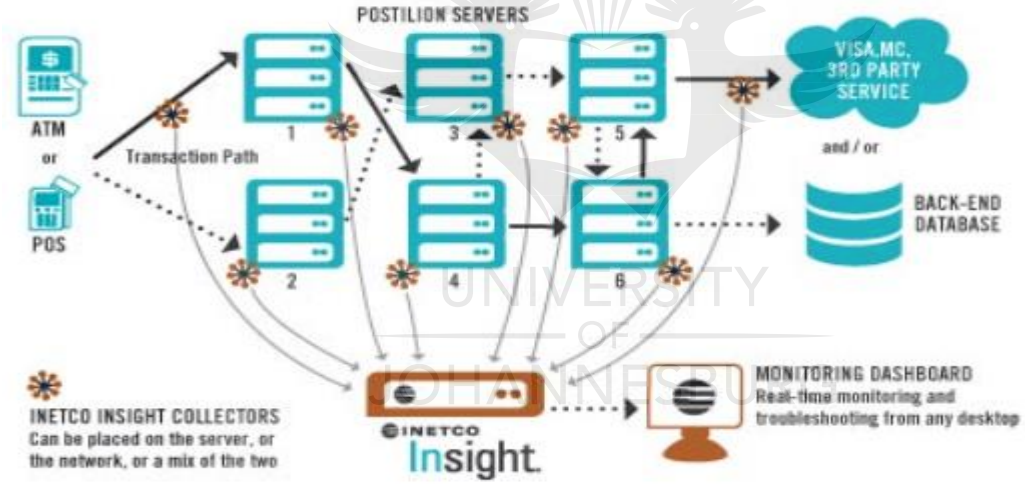
Observations showed that in 2018, many organisations such as Liberty life in South Africa went through serious cyber-attacks and data breaches. Brainstorm (2019) identified well-known cyber security trends and upcoming attacks such as the use of homoglyphs to make character appear as similar but with difference in meaning, elongated URL and phishing sites to be aware of:

- Laggards as hot phishing attacks targeting organisations with soft and old security system. This suggests continuous upgrade of security systems
- Credential stuffing where hawkers use old credentials that are reuse by users to easily penetrate the domain
- Upgrading attacks where cyber criminals constantly change their target source (Server, domain, endpoint) in the company
- Negligence of basics where system’ users utilise easy-to-guess passwords or many users sharing the admin account rendering active directory practices vulnerable
- Outsourcing security needs can be a source of external attacks. Hence the need of security skills in companies
- Harnessing of artificial intelligence by cyber-crime syndicates
- Cyber liability insurance to remain covered in preventing or recovering data breaches whatever the level of attacks

- Cyber criminals in the office where employees expose internal system and data to hijacking
- Increase of political shenanigans whereby people' personal information are hijacked and expose to medias for political or other reasons.

System Architecture

Nedbank uses the INETCO insight solution to complete end-to-end banking transactions and efficiently monitor every hop though its complex path. Banking transactions done at the ATM or at the POS terminals are sent to the postillion switches that route operation to their appropriate destination namely third party or back-end database. Practically, complex transactions require each server to route a specific transaction and each transaction on its turn can go through multiple servers to communicate the information to the backend database and third party. The INETCO insight software informs in case of any transaction issues and network slowdowns at any terminals.

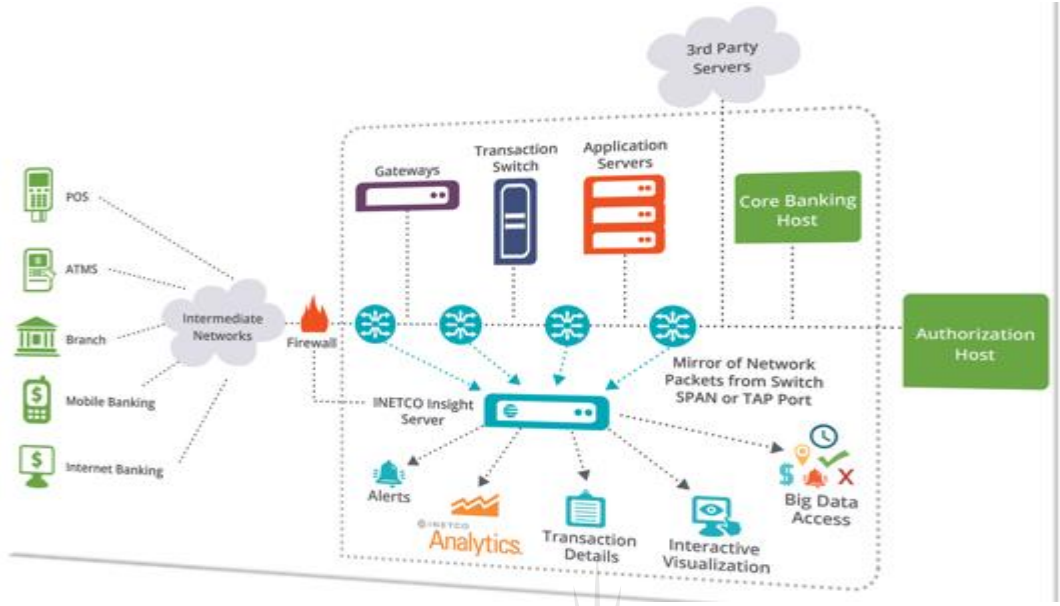


Source: INETCO (2020)

Figure 6.9: Complex postillion active/active architecture

INETCO Insight software monitors banking transactions and data acquisition to provide real time payment transactions between omni-channels banking such as POS, ATMs, bank branch, mobile banking and online banking. The system architecture contains a multi-point monitoring system that quickly identify man-in-the -middle attacks and reactivate switch security in the firewall barrier. The authorisation host and the core-banking host check information from the gateways, transaction switch, application servers and third-party servers. INETCO Insight then

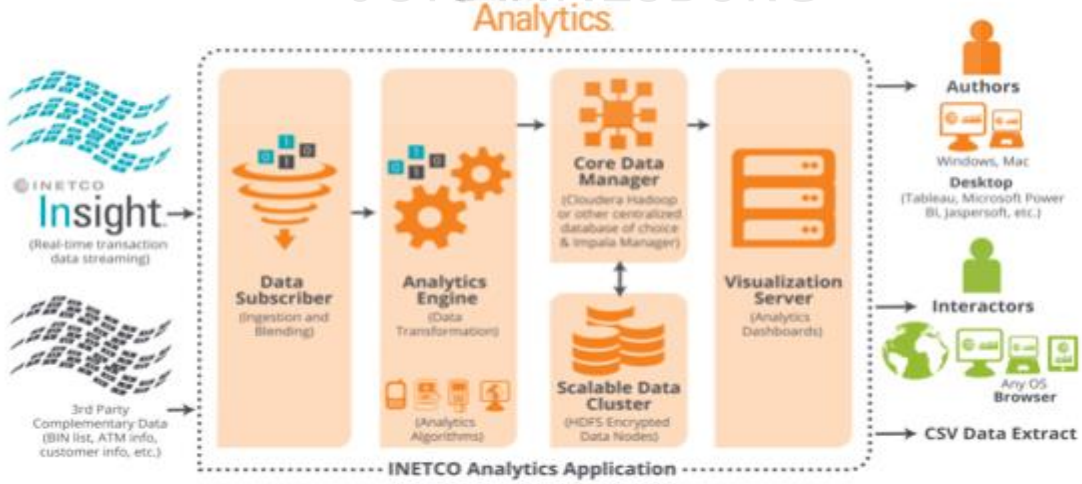
monitors the mirror traffic information from both SPAN and Tap port from the routers. From this stage, INETCO Insight now mange alerts, analytics, transaction details and big data access.



Source: INETCO (2020)

Figure 6.10: INETCO Insight transaction data

INETCO Analytics use streamed data from INETCO Insight platform that goes through data subscriber and the analytics engine and is finally monitored by the core data manager and the scalable data cluster before being stored in the visualisation server. Queries and reports can therefore be analyses, saved or be extracted in a csv format. The architecture is built as follow.

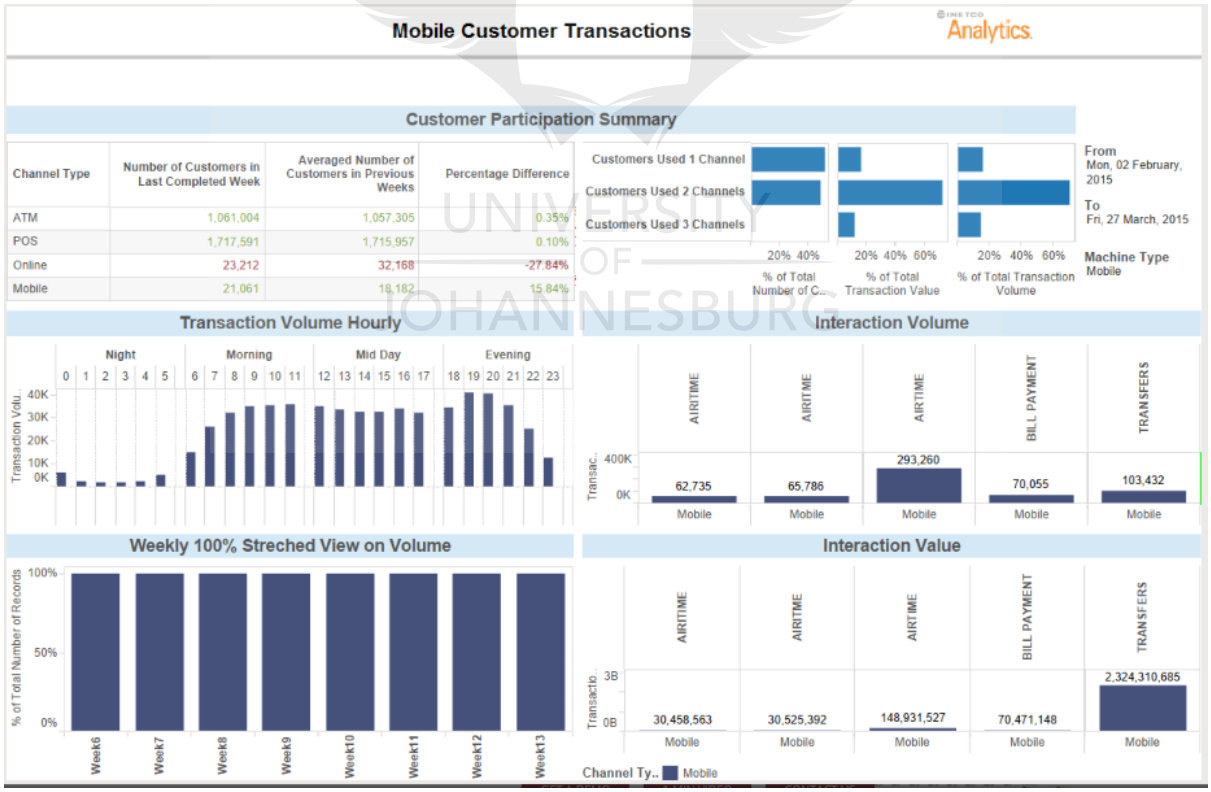


Source: INETCO (2020)

Figure 6.11: Data Analytics Architecture

Data Analytics

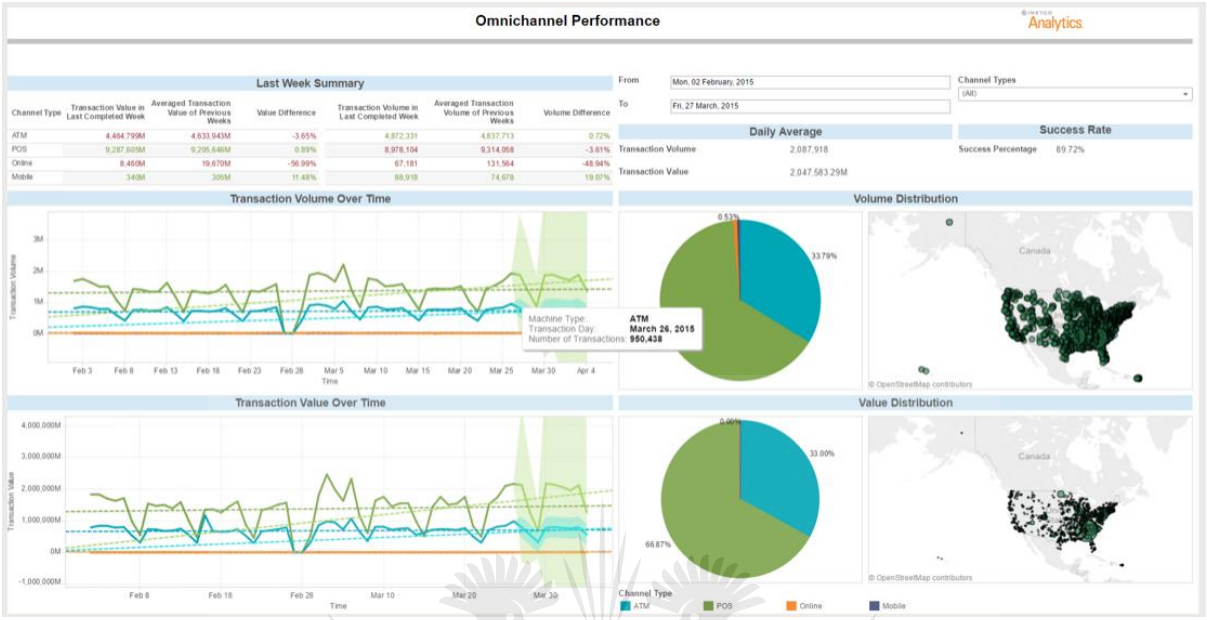
INETCO insight analyses customer data in a timely and cost-effective way through reduction of transaction failures, smart responsiveness and decision-making. Improving operational productivity also enhance customer experience through effective data analytics. As a decoding engine, INETCO decrypts all transactions protocols and message types collect from the omni-channels and send them to the middleware environments such as IBM, SQL, SOAP, WebSphere MQ, TCP/IP and so on. INETCO Analytics software uses cleansing algorithms to ensure data lineage and streams data from all channels. Its forward alerts and statistics to the subscription engine for complete access to the dashboards and reports. A solution architecture allows to easily access data for queries, business insights and interactive analytics. The visualisation server helps to access and view data trend and patterns without any dependence to the IT team. Several data analytics can be visualised at the bank namely omni-channels banking analysis, debit, prepaid and credit card analysis, digital banking analysis, fraud analysis and monitoring and so on. The mobile customer transactions analysis displayed on figure 6.12 below evaluate customer interaction volume and value within the mobile channel.



Source: INETCO (2020)

Figure 6.12: Mobile customer transactions analytics

The omnichannel performance shows that 33.79% of customers use ATM with 33% of value distribution while 65.68% use the Point of Sales (POS) channel with a value distribution of 66.87%. surprisingly, only 0.53% of customer use the online and mobile banking.



Source: INETCO (2020)

Figure 6.13: Omnichannel performance analysis

6.3.4 Technological Innovation at Standard Bank

Smart Innovation

One of the smart innovations at Standard bank is about digital payment methods such as SnapScan, Masterpass, tap to pay and MyBills. Multiple digital products and services such as share trading, stockbroking, merchant, foreign exchange rates and market are getting obtainable through business online and internet banking. Similarly, insurance, life insurance and standlib transactions are completed via online using bank websites or through bank application. Smart devices such as iPhone X allow users to secure their logins using app code, fingerprint or face ID. DigiMe is an innovative solution designed to strengthen and secure digital profiles. The user should connect to the STD bank app to capture his ID, scan his ID and take a selfie. Digital payments can be done using the followings:

SnapScan: SnapScan app has a SnapScan merchant account that is linked to a SnapCode allowing business customers to make snap payments without needing cash, cards of EFTs.

Autolink: AutoLink devices such as VeriFone and incognito ensure secured card payment transaction using built-in WIFI, radio pad and dial-up data connection.

AutoSwitch: AutoSwitch is an integrated till point solution for merchants whether large or small.

Masterpass: The payment is done using popular digital wallet.

BluMobi: This payment method accepts PIN-based card payments for business.

Ecommerce and Mcommerce: Payments are done via the website, mobile site, or app.

Simplyblu is an innovative online ecommerce solution enabling customers to run online businesses from a secure platform. From eInvoicing to eRecepting process, STD Bank allow the customer to drive sales on social medias platforms.

Mail order – Telephone order (MOTO) functionality allows customers to email order or telephonically place an order with virtual payment processing solution when customers are not physically present.

Standard bank has initiated virtual banking through use of digital wallets as follow:

WeChat wallet can be used without holding a bank account to store, send, withdraw and receive cash through smartphones.

Shift global wallet allows to buy, sell store or spend foreign exchange using mobile app.

Instant Money wallet allows to load money and draw cash or buy prepaid to any cellphone in South Africa.

SnapScan wallet helps to send money to recipient who has the SnapScan or top-up your own wallet using the App wallet features.

Digital wallet application allows to covert, transfer, send and receive money in a preferred currency.

Internet of Things

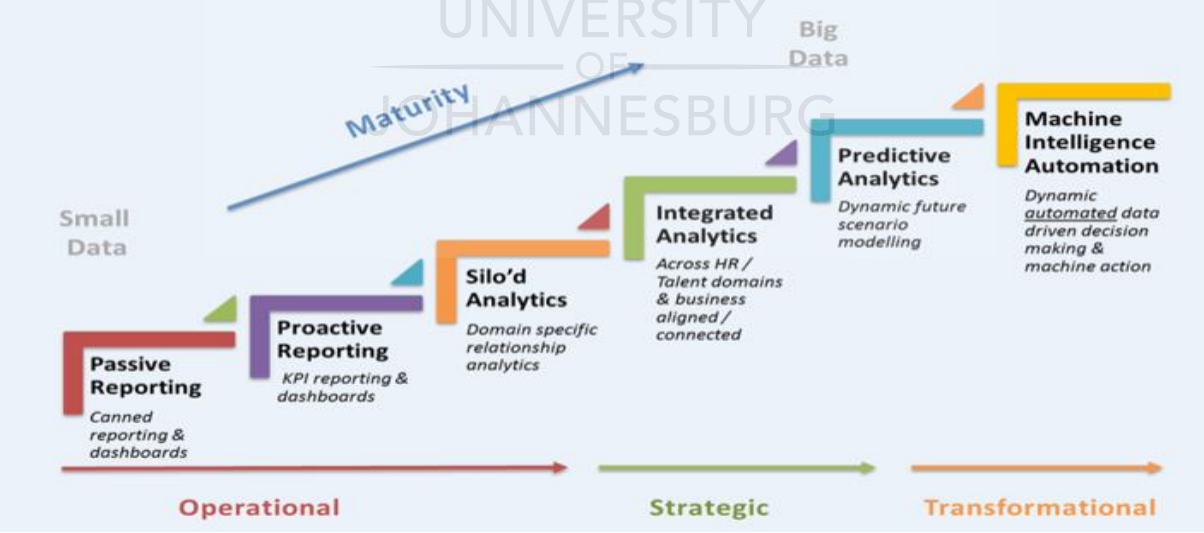
The use of internet drives banks to invest on data analytics as a bottom line of business productivity increase. Going online with the business requires a host for the company website so that it can be access over the internet. Depending on the speed, on the cloud services required and the core business activities, the following hosts can be use: Rackspace, Amazon web services, digitalocean, bluehost, Dotcloud, WP engine among others.

Smart Devices

Customers at standard bank can order a SIM and linked it to the bank account. Apple, Huawei and Samsung devices are sold by the bank at a competitive price to ease digital banking namely Apple iPhone PRO, XR and XS, Apple iPhone 7, 8 and 11, Samsung galaxy A7, S10E, A2 Core and Y7 2019 as well as Huawei P20 LITE. Smart devices such as iPhone X allow users to secure their logins using app code, fingerprint or face ID. Verifone and Ingenico autolink devices allow making digital payments.

Data Analytics

Banking transactions from the omni-channels are big in volume and require insights since data management and quality are vital for business growth. From data analysis to forecast, data analytics software produces relevant reports to guide business decisions. Following data-related security and privacy, business intelligence relies on data quality, data automation and easy data recovery to generate embedded analytics. Big data are evolving in a sense that they were small data using passive and proactive reporting and Silo'd analytics during the operational phase. Before business transformation, integrated analytics are used across the business as part of the strategic approach put in place. Digital transformation leads to the maturity of big data that requires machine intelligence automation to run augmented data analytics for all functional units and the entire institution at once.



Source: Fosway (2020)

Figure 6.14: Big Data Maturity

Artificial intelligence

Artificial intelligence and machine learning in banking are leveraging front-end and back-end operations through increase on productivity. Intelligent machines enhance customer service, fraud prevention, portfolio management, and credit as well as loan decisions in addition to reducing operational costs while providing regulatory control. The head of data exchange, data platform & AI at standard bank stated that effective outputs from artificial intelligence rely on data engineering best practices. This implies that data should be cleansed and well-structured to easily flow into management information, business and Artificial Intelligence (AI) processes (Itwed, 2020).

Source: Twitter (2020)

Figure 6.15: Standard Bank Robot - Pepper

Cyber security

The increase of internet connectivity goes in hand with the level of cyber-attacks on banking transactions. Standard bank has developed a security centre that works to protect customers against card fraud, phishing, vishing and smishing. The entre ensures safe online shopping, safety bank card and stay informed for innovation improvements. STD bank provides safety conditions for customers to bank securely and makes sure that they are aware of the latest scams through online publications. The following good practices are executed by the bank to ensure secured transactions:

- Automatic timeouts and limited banking sessions for all channels when the user is not active.

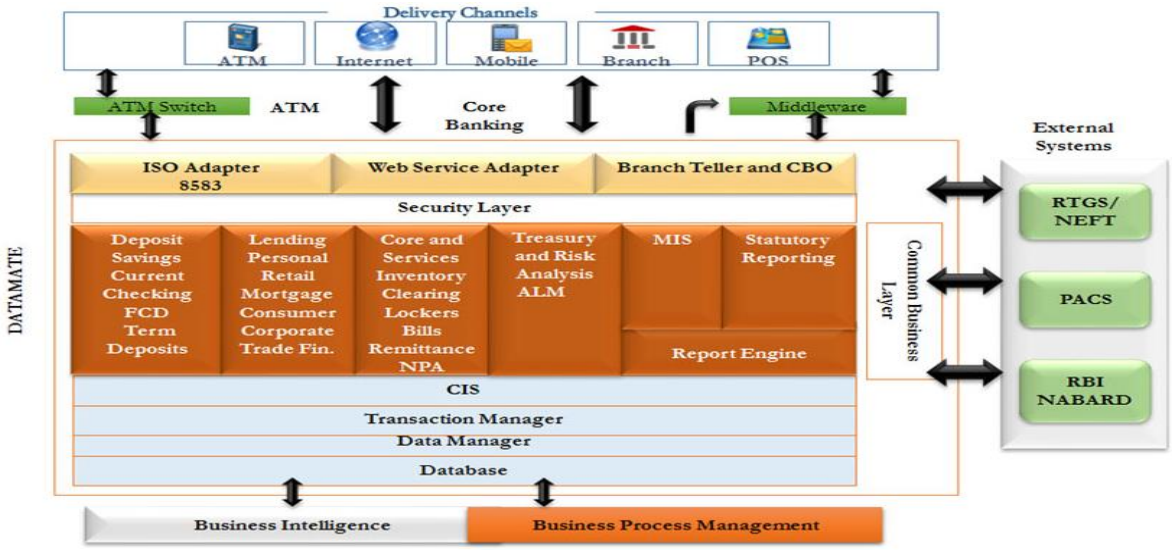
- Emails alerts to notify customers on any banking transactions.
- Online banking login SMS to notify online connection.
- Free access to specialised malware removal software offers by the bank to clean and protect their PC from catching malicious software.
- Secure centre updates on the latest scam to acknowledge current fraud tactics.
- One-time password also known as OTP SMS for payment authorisation.
- Convenient and secure logins using application code, fingerprint or face ID.

Since there are continuous system upgrades, users should make sure that they have the latest version of security system to avoid infiltration by hackers. The following types of scams are raised by fraudsters:

- Vishing, phishing, twin, Sim swipe, 419, holiday, smishing, email hacking, deposit and refund, online good scam as well as dating and romance scam.
- Remote access takeover scam: fraudsters use the trick of remote access control to take control of your computer and keep it vulnerable for online banking fraud.
- Change of banking details scam.
- Number porting scam: Fraudsters transfer your cellphone number to another network service provider without you being aware.
- Spoofed website scam: Fraudsters mimic a legitimate website of an organisation to trick people and collect their information.
- Keylogger scam: a software is used to record keystroke entered in your PC allowing fraudsters to collect your personal information.

System Architecture

The process manager manages business processes and the data manager run the master data.



Source: Datavsn (2020)

Figure 6.16: System architecture

6.4 Digital Customer Experience

Corporates as well as financial institutions currently focus on customer experience improvement that meet the standard of digital solutions and business process implemented at the banks. Customer experience is boosted by social medias, customer engagement.

6.4.1 Customer Experience at Absa bank

Absa bank believes on successful outcomes to arise when consumers are continuously educated and upskilled enough to make effective and efficient financial decisions. In this regard, Absa provides knowledge and skills transfer to existing, future and potential consumers to contribute to the development of consumer knowledge. Understanding of financial products and services also enhance education of consumers through specific programmes for empowerment purposes. Absa bank has an option about pricing calculator that helps end users and customers to automatically calculate their banking fees and other financial charges.

Communication channel

Absa bank has defined several ways to do banking transactions such as chatbanking, mobile banking and cellphone banking. ChatBanking using social medias like Facebook messenger and twitter. Mobile banking application improving mobility. Cellphone banking site with no downloads or data usage. Absa bank also ensures support and communication with customers through display of contact details, switch to Absa Facebook, Twitter and LinkedIn, send your

feedback and the new Absa Frequently Ask Questions (FAQs). Absa especially innovate in upgrading their media centre with group announcements and monthly media releases that disclosure banking updates gradually. Absa online applications are equally available on App Store, Google Play,Windows Store and Blackberry world stores.

Social Medias

As part of the customer experience, Absa bank is present in social medias to improve customer communication and specially to improve customer expectations. Absa bank is active on the social medias especially on Facebook via Messenger, Twitter, LinkedIn and Chatbanking on WhatsApp. The impact of social medias and the use of application installed on the smart phones also drove Absa to have their own application named Absa application. Absa application helps to achieve online and cellphone banking and mostly to track safe banking transactions.

6.4.2 Customer Experience at FNB bank

Customer experience management is vital for performance sustainability through customer mobility, engagement and retention. Consumers who are the end customers have their own perception of how they project their relationship with the bank going forward. FNB bank has been empowering customers to uplift their capacities of communicating electronically with the bank via online banking. FNB brings customers and stakeholders to act responsibly and responsively as a result of experience acquired.

Social Medias

FNB is present in social medias such as Facebook, Twitter and LinkedIn. FNB has launched FNB Facebook banking to allow end customers to access banking services from the biggest social network. FNB identifies powerful opportunities in exploiting social media's platforms as additional digital footprints on top of the existing ones. They believed that social medias channel allows to easily engage with customers across various areas such as marketing, sales, transacting and support. Users only need to link their Facebook profiles to their cell phone banking profile. FNB presence on social medias help to monitor customer needs and expectations and thus attend to customer complaints and grievances. Replacing the one-on-one between consultant at the branch and the customers and Improving relationship with customers through quick response to their concern as established by Memeburn (2019). As part of the innovation process to meet the bank of the future, FNB starts to invest on social commerce today for competitive advantage in the next few years. Although social Medias enable high

level engagement with customers, it is important to note that digital natives' behaviour is so diverse that banks need to do more to gain their confidence.

Self-Learning

Based on the daily experience that customers acquired through social medias and the use of smart devices, FNB (2019) has published a specific tab about calculations methods and results of some of the products such as loans, credit cards vehicle repayment and so forth. Following the customer-centric approach applied at FNB, the below options are published on the FNB website to shed a light on the different calculations made on the banking transactions:

Home loans

Affordability: This calculator helps customers to evaluate the amount of home loan they can qualify for considering their income, expenses, interest rate and the duration.

Bond Generator: This calculator allows customers to understand all costs involved in a home loan before application including initiation fee, interest rate, monthly repayments in addition to a lumpsum payment or not.

Replacement value: This calculator helps to calculate the replacement value done by the home insurance. OUTsurance is the home insurance by default at FNB bank.

Day to day banking

The following options are displayed:

Budget: Budget calculator allows customers to calculate spare amount for monthly home pay besides regular expenses per month.

Future value: This calculator helps to calculate the future value of home loan based on the deposits, investment periods and interest rate to be earned.

Credit Cards: This calculator helps to determine the cost of using a credit card to do banking transactions considering the interest rate and the amount borrowed.

The following options are available among others:

Share builder: This calculator allows to determine the net value of shares including gross consideration, brokerage fee, VAT, trade cost and so forth based on the number of shares and the price per share.

Share investor: This calculator allows to determine the net value of shares including gross consideration, brokerage fee, IPL, STRATE, STT, VAT, trade cost and so forth based on the number of shares and the price per share.

Vehicle repayment: This calculator helps to determine the monthly repayment amount of the vehicle based on the vehicle price, deposit, number of terms, interest rate and the balloon amount.

Vehicle purchase price: This calculator helps to determine the vehicle purchase price considering a monthly repayment amount, deposit, number of terms, interest rate and the balloon amount.

Forex: The forex calculator helps customers to determine the amount in foreign currency based on the amount in ZAR currency for both buying and selling transactions.

Communication channel

FNB bank has launched different communication channels to ease banking transactions whenever and wherever and thus meet customer experience. Customers can use ATMs or choose to go to the bank branch. Online and cellphone banking, watch application, application for Smartphones and tablets are preferable channels. Digital payments solutions such as FNB Pay, partner Wallets, security and technology improve digital payments. This communication channels enable the bank to disclose product rates, pricing guide, rates, indicators and share price to make it available at any time for customers wherever they are. Additionally, FNB disclosed vacancies un the careers at FNB tab since customers are now used to apply directly to organisations without any need to go through agencies.

6.4.3 Digital Customer Experience at Nedbank

Nedbank has a tab named “What’s new” that allows the customer and the public to be aware of the new features. Customers know about real time service deliver from other networks and expect the bank to be the same through real time transaction monitoring and proactive problem solving.

Communication channel

Digital customers now have multiple channels to communicate with bank or complete banking transactions on their own. The following channels are operational at Nedbank: ATM, Online banking, mobile banking, Nedbank application, Nedbank Money App and Nedbank POS devices. Nedbank branch, WAP, USSSD, Website and cookies and Email address

Social Medias

Social medias enable direct contact with the customers specially in terms of reporting fraud and unethical behaviour. Nedbank is opened to social medias such as Facebook, twitter to improve customer expectations and thus improve customer experiences Send feedback.

6.4.4 Customer Experience at Standard bank

Communication channels

Customers at Standard bank can bank through online banking, client portal, mobile App, cellphone and telephone banking and via ATMs. Feedback from customers in the social are valuable data that are analysed to produce predictive analytics. STD bank has a UCount Rewards programme designed for businesses every time that they use their credit, debit and cheque card to buy fuel, flight ticket, retail shopping or social work.

Social Medias

STD bank releases relevant content on it social media platform namely Facebook, Twitter to improve customer experience. The bank also expects significant feedback from the customers in order to improve the quality of data to publish.

Intelligent machines

Fast reporting systems and less data entry improve customer experience the use of intelligent machines at the bank have maximised real time service delivery and customer satisfaction through personalised insights and linkage of customers to the products and services that suit his needs.

6.5 Digital Business Process Reengineering

Digital transformation has brought South African banks to rethink about how to effectively deliver banking service and get customer satisfaction. This suggests that traditional banking methods have been replaced by reengineered banking processes. It still happens that one banking transactions must be done both via online banking and with the presence at the bank branch. Hence the status of “Digital shy” as described by the BearingPoint Institute for the South African banks.

At this stage, all South African banks provide the following products and services via digital channels such as online and cellphone banking, payment terminals using smart devices.

- Business, investment, cheque and saving account
- Bank debit and credit card

- Personal, business and home loans
- Funeral and insurance plan
- Smart devices for payments, money transfer and foreign exchange

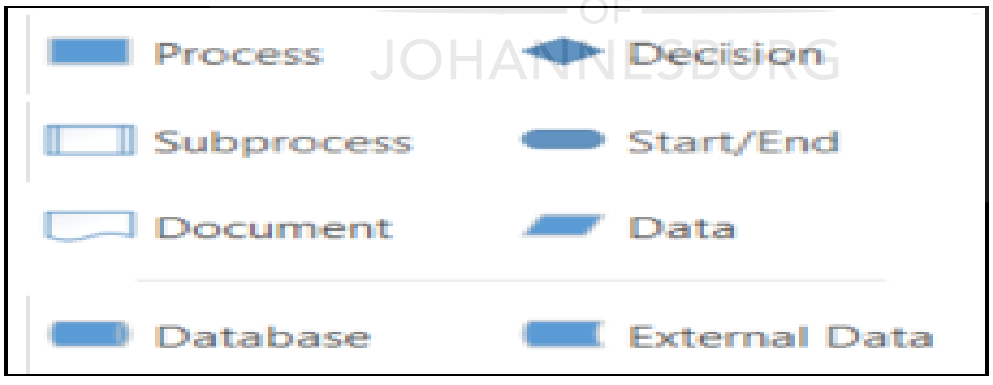
From classical or traditional to digital banking process, digitalisation serves as bridge

Digital banking processes

Standard banking processes are the foundation of digital banking processes using digital channels and platforms. Digital banking processes involve big data management, data analytics, intelligent machines, air-ware, e-trading and robotics among others. Evidence shows that the use of digital channels has transformed traditional or classical banking processes leading to the reengineering of digital banking processes. The following section is about designing of digital banking processes compared with traditional processes. The comparison has a unique objective of showing the gap created by the digital transformation.

Digital Banking Processes

The following banking processes have emerged from the era of fourth industrial revolution forcing banks to adopt digital methods to remain leaders in the financial market while improving the productivity and the customer satisfaction. Step by step processes have been designed using Microsoft Visio Professional that includes flowchart techniques for end-to-end process between stakeholders. Below are the symbols used to design the banking processes.



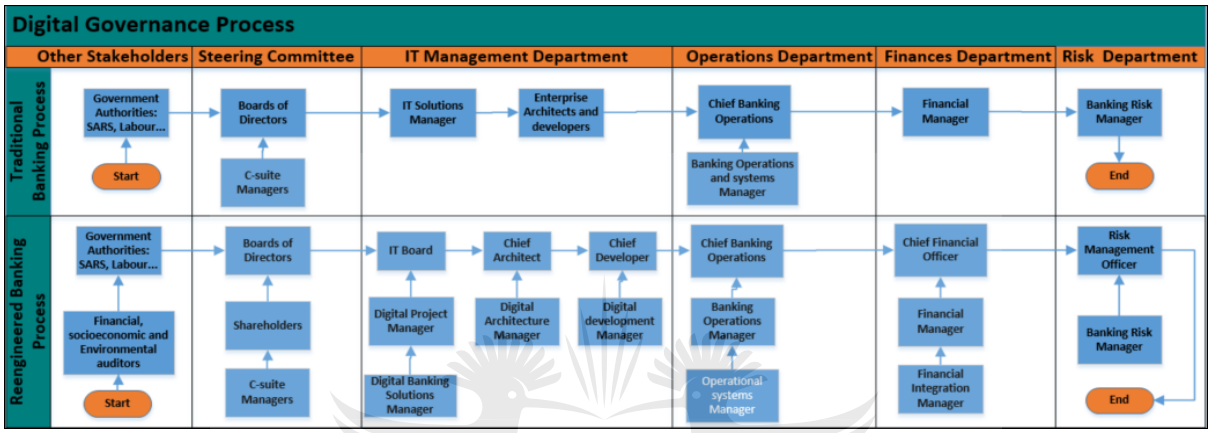
Source: Visio Professional

Figure 6.17: Flowchart Symbols

Every digital banking process start with the start/end symbols same as the end of the process. The decision symbol must have two outcomes for “yes” and “No”.

6.5.1 Digital Governance process

The governance process makes sure that the business is well-structured to meet value creation. Governance process highlights responsibilities of the board of directors and other relevant stakeholders. For example: when the bank wants to digitalise their banking processes, a specific implementation process needs to be presented to the steering committee for approval since it involves financial costs. A hierarchy of governance structures involves many levels such as corporate, IT, operations, finances and so on with their individual operations and processes.

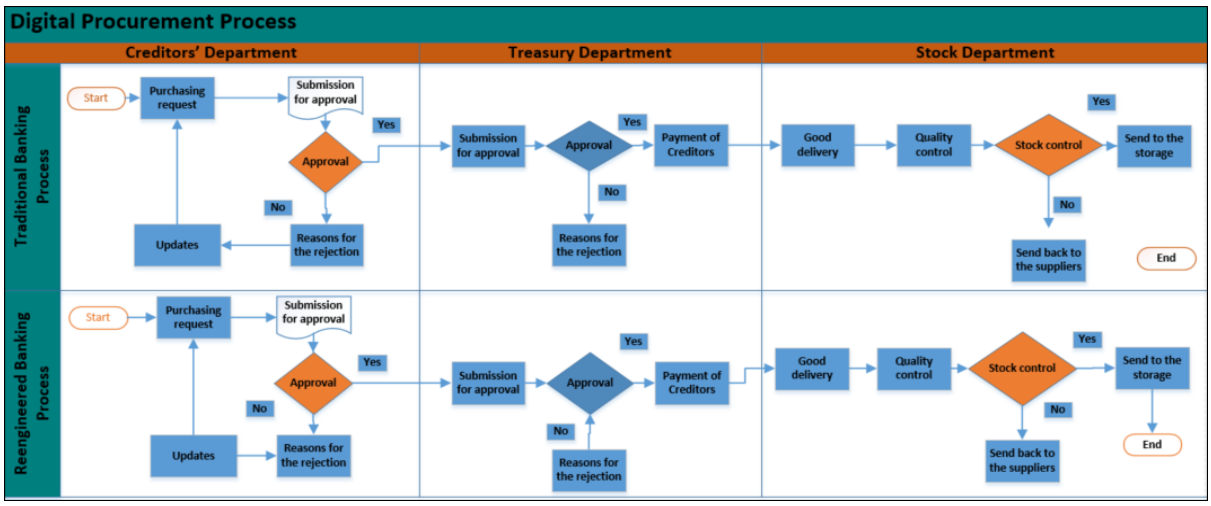


Source: Own Compilation

Figure 6.18: Digital Governance Process

6.5.2 Digital Procurement process

As an entity, banks also follow the supply chain to provide themselves with stationary, IT equipment, smart devices and so on. The product is bought, stocked and later delivered to the end-users who are the bank 'customers. The procurement, the stock and the treasury departments are involved to complete the end-to-end process following related decisions.

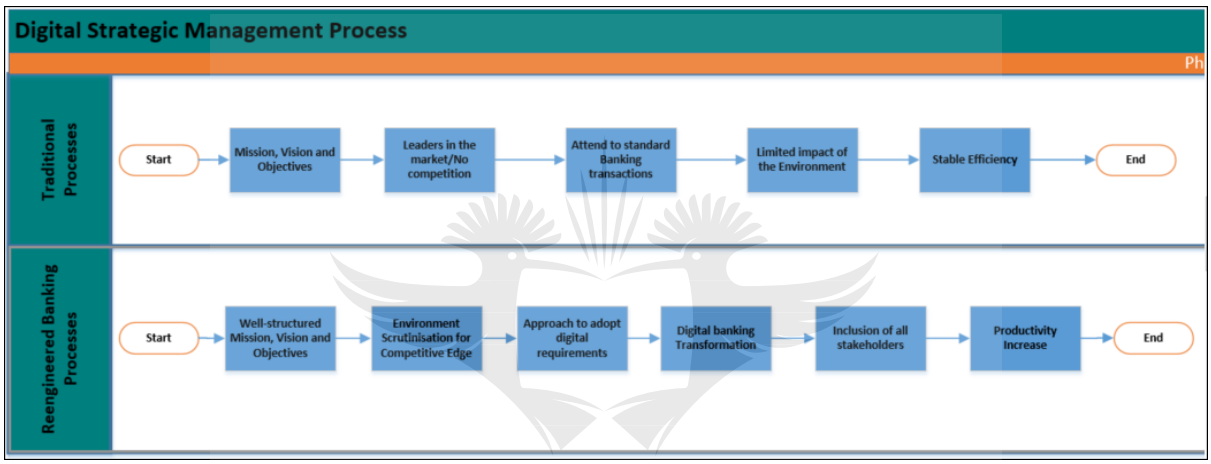


Source: Own Compilation

Figure 6.19: Digital Procurement process

6.5.3 Digital Banking strategic process

Digital banks still follow standard strategies such as differentiation, market positioning and segmentation among others for business management. Digital emerging strategies include customer and product-centric, change driven leadership and security driven strategy among others. Comparison between traditional and reengineered banking process show that digital banks have well-structured mission, vison and objectives to meet while involving all stakeholders.

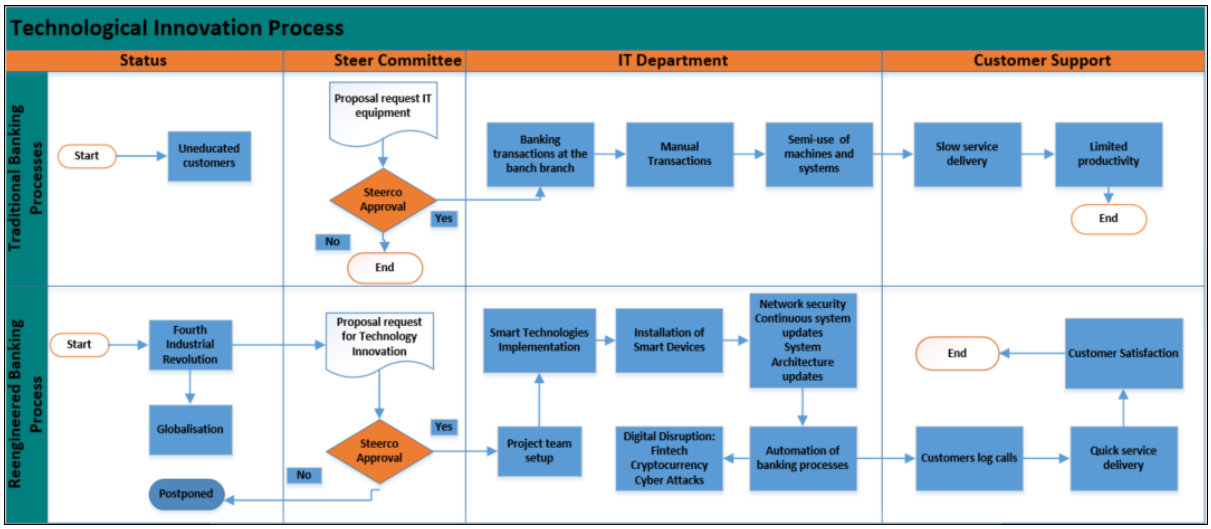


Source: Own Compilation

Figure 6.20: Digital Strategic Management process

6.5.4 Digital technologic innovation process

The digital technologic innovation starts with the globalisation and the fourth industrial revolution (4IR). Since banks are managed by many people whether shareholders or not, request for the technological upgrading needs to be approved by the steer committee. Once the approval is done, the project team is setup in the IT department to proceed with the implementation of smart technologies and devices. Moreover, the IT department ensures network security, system architecture updates and the automation of banking processes.



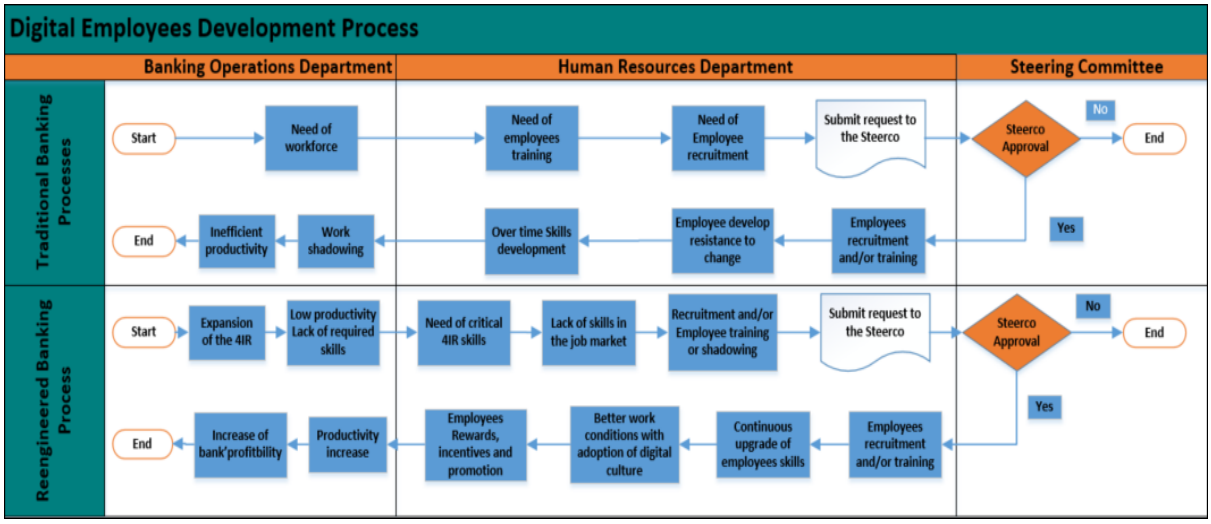
Source: Own Compilation

Figure 6.21: Technological Innovation process

It is important to mention the influence of digital disruption such as the Fintech and the cyber-attacks associated with technological advancement. The customer support department solve call logged by the customers and thus ensure quick service delivery that increase customer satisfaction. Smart technologies include a lot of technological innovations namely Artificial Intelligence, Robotics, Nanotechnology, Advanced Biotechnology, Autonomous Vehicles, Quantum Technology and Genetic Engineering among others. Banks have a choice between them depending on the core business and the future goals set by the business. Implementation of the above technologies require appropriate architecture platforms such as Internet of Things, data Management and cloud Computing.

6.5.5 Digital employee development process

The process of digital employee development involves the banking operations, human resources and the steering committee that gives authorisation where required. The expansion of the 4IR and low productivity trigger the training demand that the human resource department must organise and submit to the steerco. Employee training can be done internally by the IT department or through external and official IT training centre. It is advisable for the bank to define rounds of training among branches to not affect the productivity. Regarding the scarcity of digital skills in the market, companies and banks go for training or shadowing to upskills the staff. Fortunately, South African Universities are now incorporating digital courses in the curriculum.

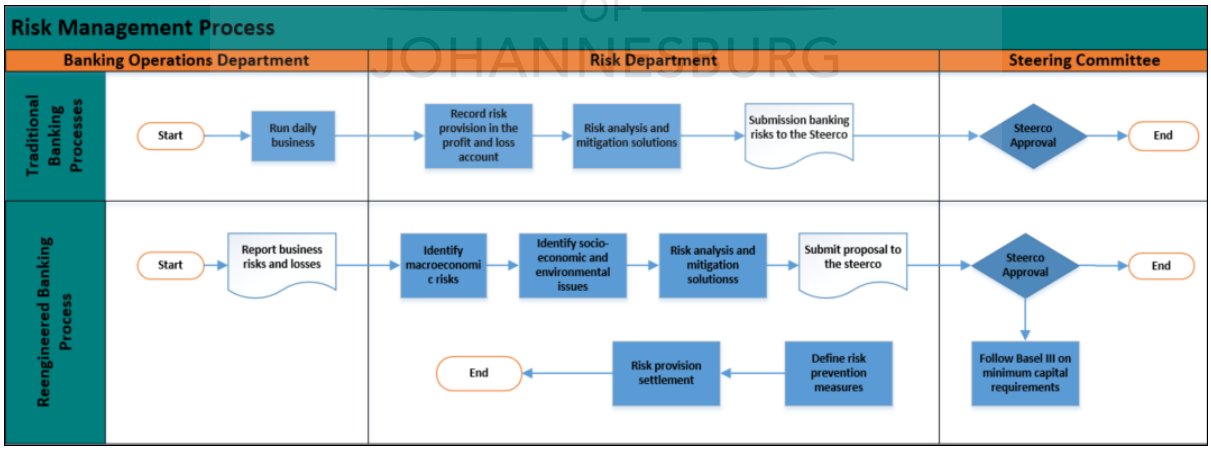


Source: Own Compilation

Figure 6.22: Digital Employee Development process

6.5.6 Digital risk management process

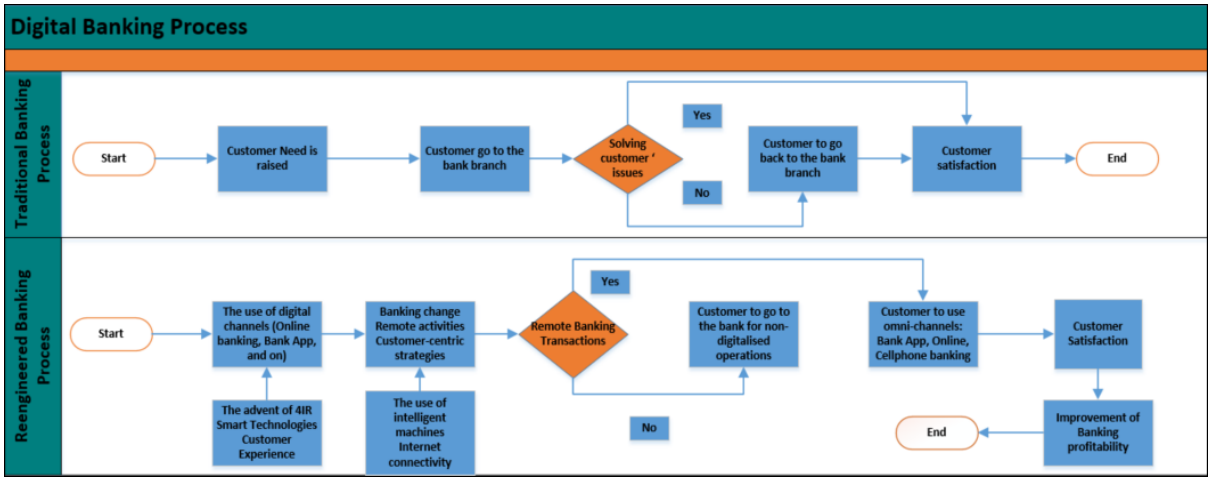
The process of risk management is monitored by the banking operations and the risk department all supervised by the steering committee. The banking operations department report business risk and losses to the risk department. The risk department is responsible for risk analysis, prevention measures and the mitigation techniques to limit the negative effects on the banking operations. As financial entities, South African comply to Basel III regulations whereby banks must maintain a minimum capital requirement to avoid financial crisis.



Source: Own Compilation

Figure 6.23: Digital risk management process

6.5.7 Digital Banking Process



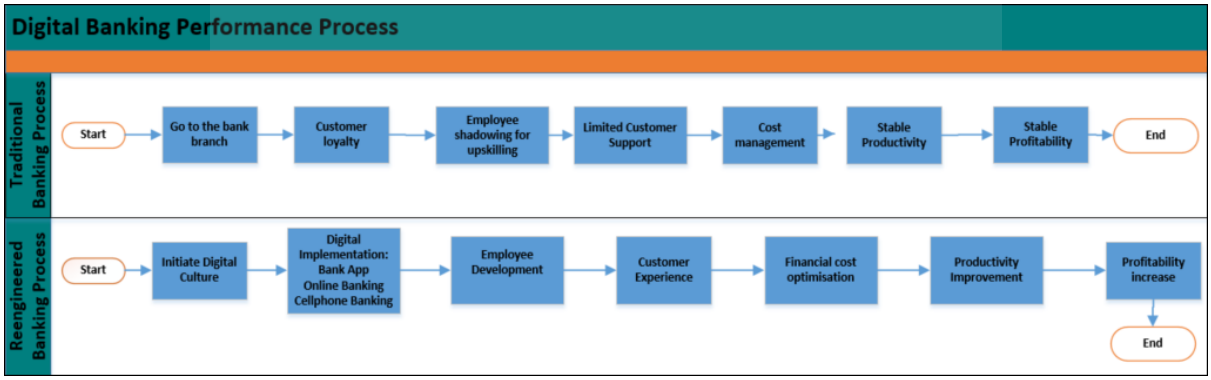
Source: Own Compilation

Figure 6.24: Digital Banking Performance process

The process of digital banking emphasises on the fact that the advent of the 4IR triggers the use of digital channels and smart technologies and devices. This gives an opportunity to the customers to choose how to bank? The customer can bank remotely online or go to the bank branch. Some customers reported the fact that they still need to go to the bank for banking transaction that cannot be online.

6.5.9 Digital banking performance process

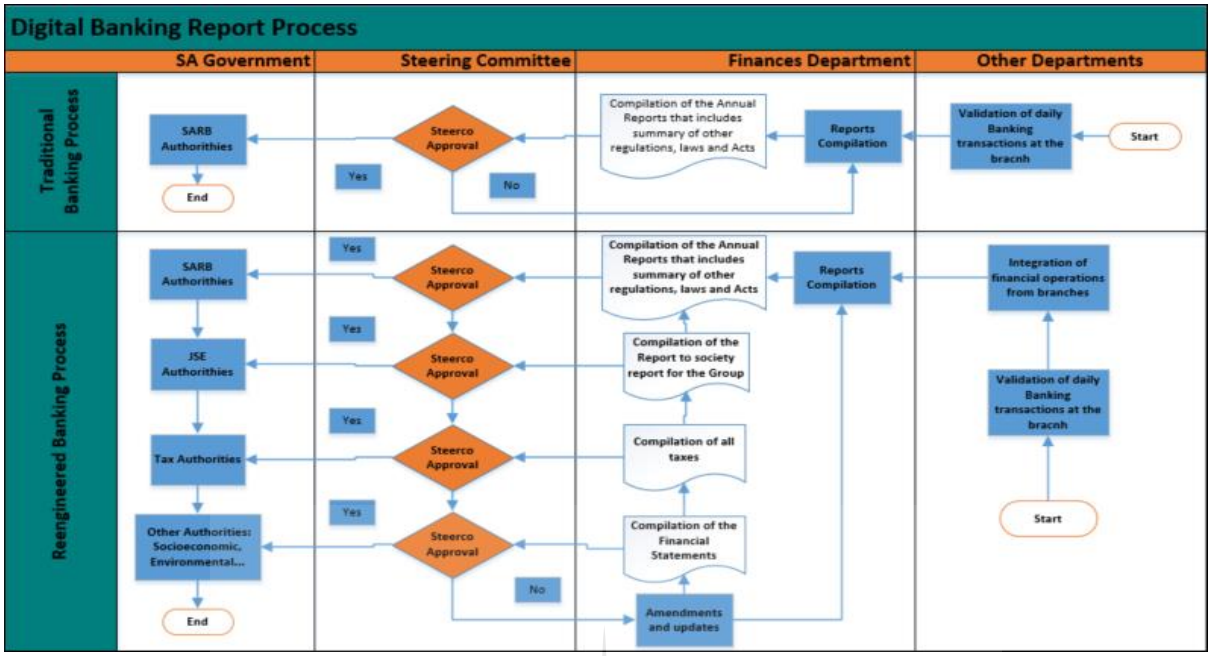
The process of banking performance highlights the fact that digital implementation in addition to the development of digital culture, employee, customer experience leads to the financial cost optimisation, the improvement of the productivity and the profitability increase.



Source: Own Compilation

Figure 6.25: Digital banking performance process

6.5.10 Digital banking report process



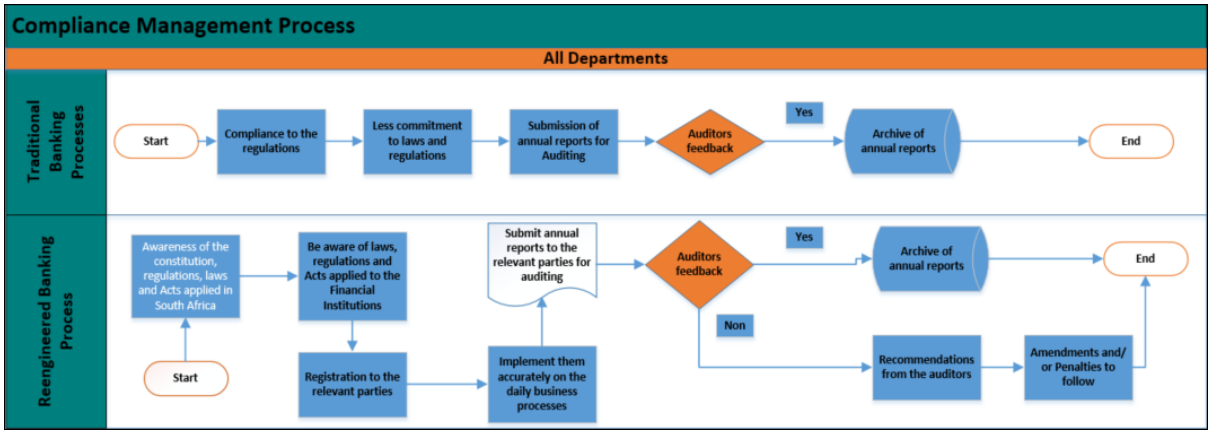
Source: Own Compilation

Figure 6.26: Digital banking report process

The process of digital banking report involves the South Africa government, the Steering committee, the financial department and other departments. When other departments like procurement and stock validate their monthly transactions, it automatically appears in the finance department where annual reports, financial statement, report to society, report to the authority and the environmental reports are compiled. These reports are then sent to the Steering committee for final validation before publication and submission to the relevant parties namely the SARB, JSE, the tax and other governmental authorities.

6.5.11 Compliance Management Process

The process of compliance involves all departments because businesses are managed according to the regulations, laws and Acts applicable at the lowest functional unit. Banks should be aware of the constitution and all legislations related to them and thus register with the appropriate parties. Banking operations should implement them accurately and submit associated annual reports to the designated authorities for auditing. Feedback for the designated authorities can lead to the archive of the reports or send back to the bank for amendments following recommendations.

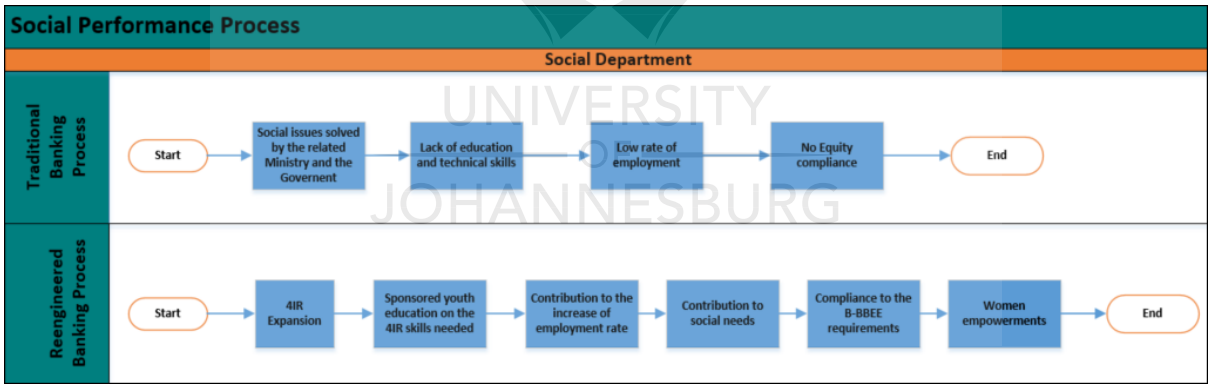


Source: Own Compilation

Figure 6.27: Compliance Management process

6.5.12 Social inclusion process

As part of the sustainable development in South Africa, banks contribute to the social improvement through sponsoring of youth education, improvement of the rate of unemployment and women empowerments. Compared to traditional banking processes, reengineered process includes compliant to B-BBEE and enhancement of the community lifestyle.



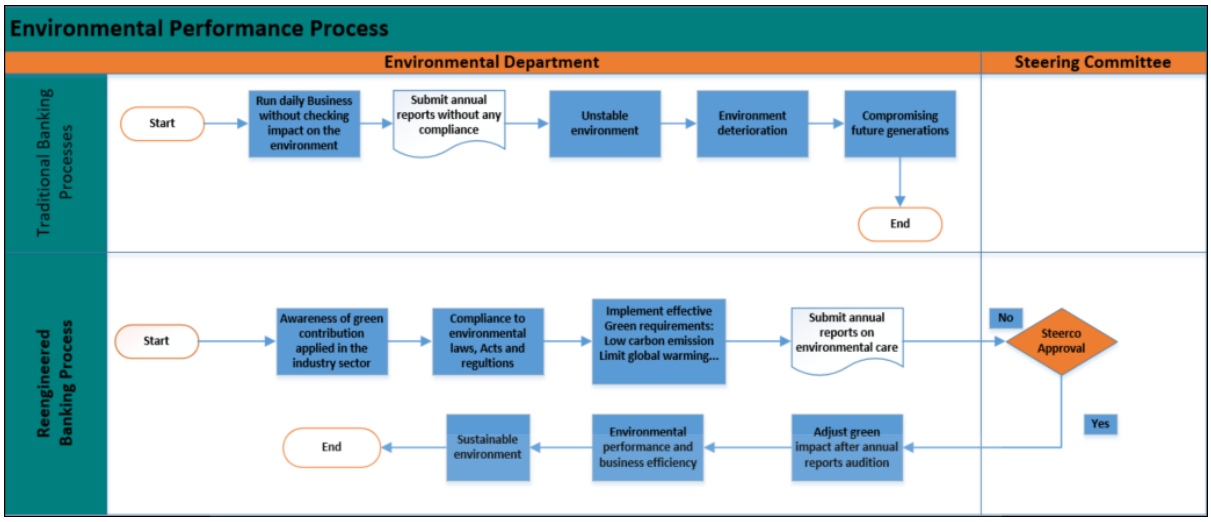
Source: Own Compilation

Figure 6.28: Social inclusion process

6.5.13 Green-friendly environmental process

The process the green-friendly environmental involves the environmental department and the steering committee that makes decisions. Following the sustainable development target, banks are responsible for the protection of the environment through awareness of the green contribution applicable in the industry, compliance to the environmental laws, Acts and legislation and the monthly or yearly submission of the annual report on the environmental

care. Green compliance is all about reducing the carbon emission, limiting the global warming, adopting renewable energy and build green buildings.

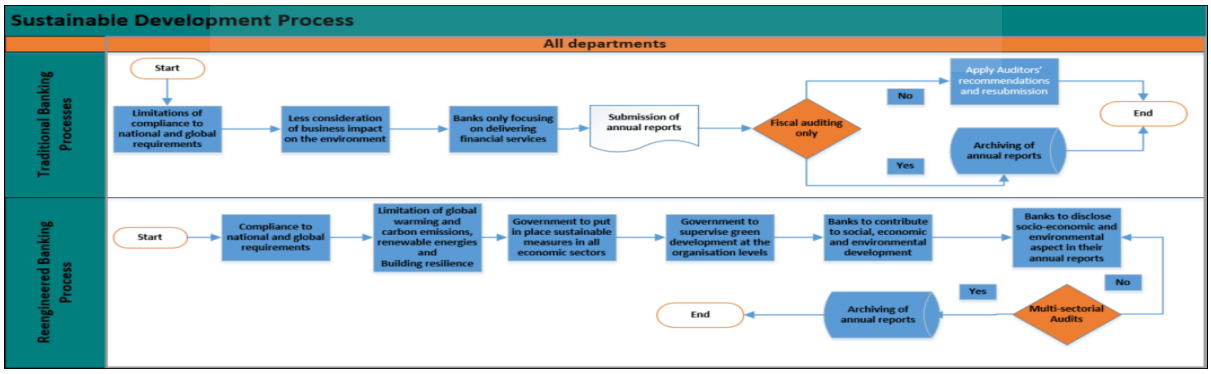


Source: Own Compilation

Figure 6.29: Environmental performance process

6.5.14 Sustainable development process

The process of the sustainable development involves all departments because every banking transaction has an effect on the environment. Banks have to comply with national and the global requirements to protect our earth planet for future generation's well-being. South African banks contribute to the socioeconomic and environmental development and disclose related reports to the public after the multi-sectorial audits. Once the feedback from the multi-sectoral audits is positive, banks archiving the annual reports as per the legislation.

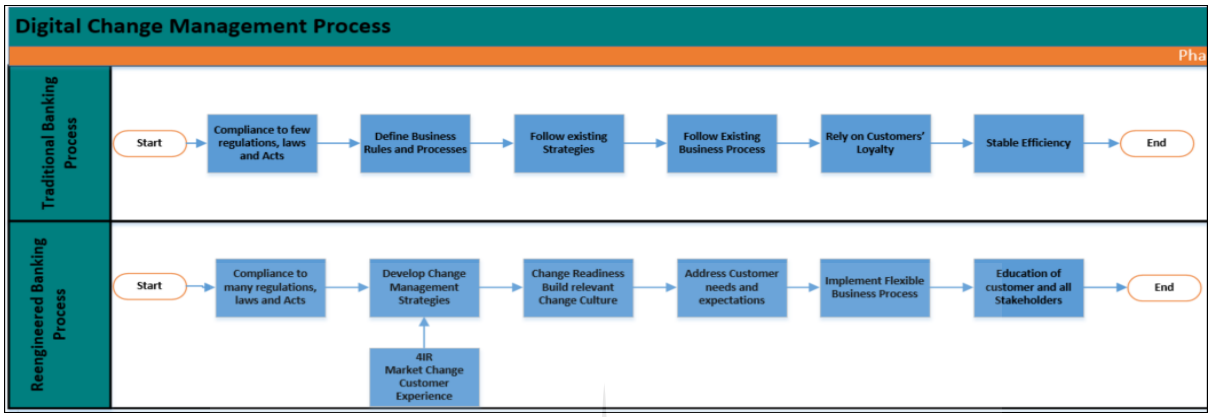


Source: Own Compilation

Figure 6.30: Sustainable development process

6.5.15 Digital Change Management Process

The process of digital change process involves all departments because change happens in the entire business. Compliance to the new regulations, digital-driven strategy an addressing "Too demanding customers" expectations, implementing flexible banking processes and educating stakeholders constitute the level of change that South African banks must rely to.

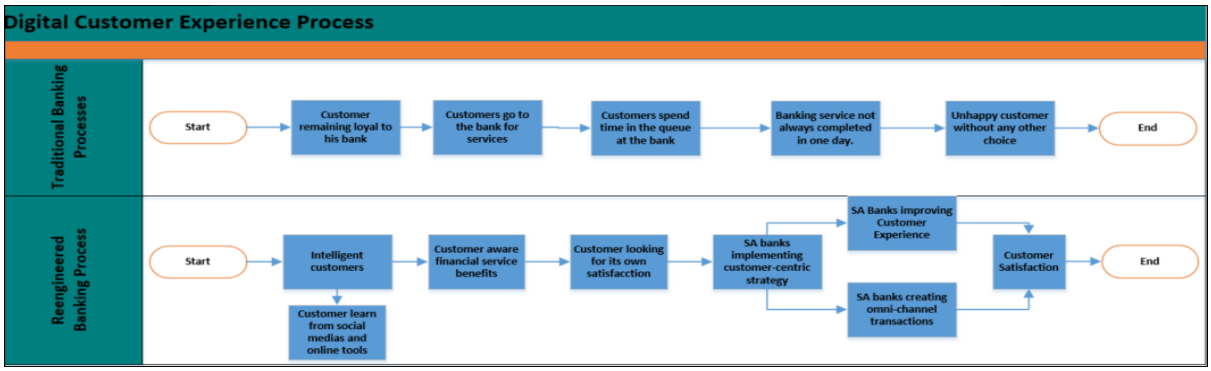


Source: Own Compilation

Figure 6.31: Digital change management process

6.5.16 Digital customer experience process

The customer experience concept raised up with the social media's appearance and especially with the so-called millennials. Customers are more aware of their needs, wellbeing and are looking for better life conditions. Such transformation has not been that good for banks since the customers have become more demanding through unbelievable expectations. From loyal to challenging customers, South African banks deploy many channels of communication and banking to satisfy all range of clients.

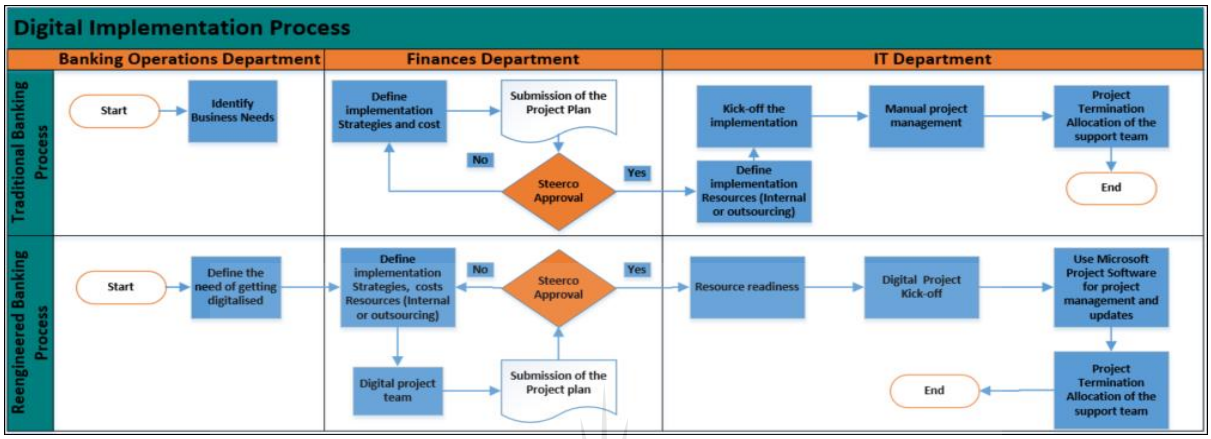


Source: Own Compilation

Figure 6.32: Digital customer experience process

6.5.17 Digital implementation process

The process of digital implementation involves banking operations, finance and the IT department. Whether from banking operations department or from the global change, the need of becoming a digitalised bank is now operational. Since digital implementation is a huge project that involves considerable financial costs.



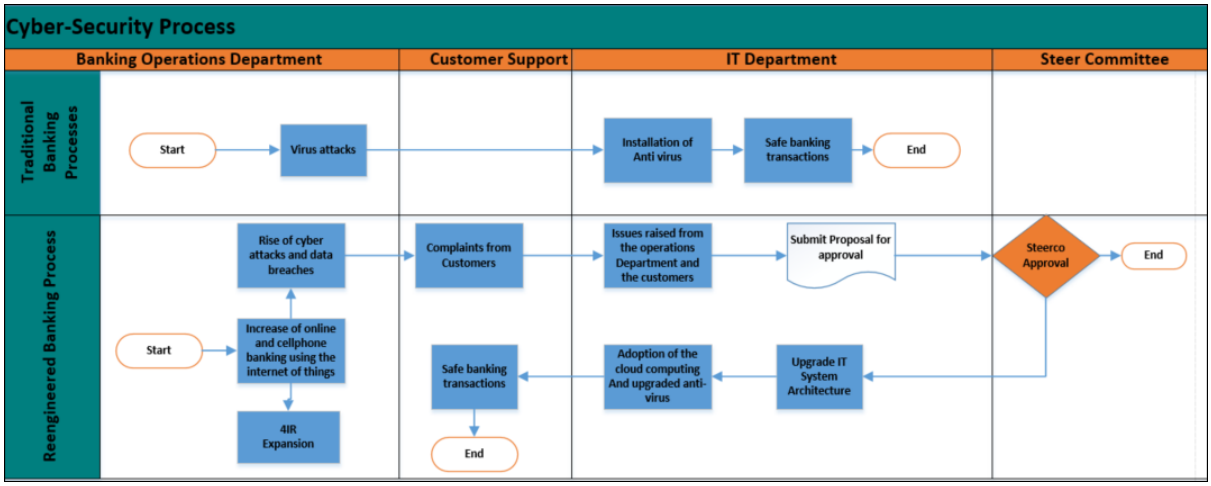
Source: Own Compilation

Figure 6.33: Digital implementation process

The finance department setup the project plan based on the requirements assigned by the Steering committee. Once the approval is made, the IT department comes into play to define resource readiness, timeframe and the scope. The IT department kicks off the digital implementation and uses relevant software such as the Microsoft project software to optimise the outputs from the project implementation.

6.5.18 Cyber security process

The expansion of cyber-attacks goes in hand with the development of online banking and digital data management. Fraudsters attack client through phishing, 419 scam and many more (see section about cyber-attacks) to collect their personal information to steal their money. South African banks have put in place a sound system architecture, cloud computing and sophisticated anti-virus to protect both banking operations and the customers. When the issues are raised by the operations or customers, the IT department and the steer committee act spontaneously to protect its stakeholders and achieve safe banking transactions.

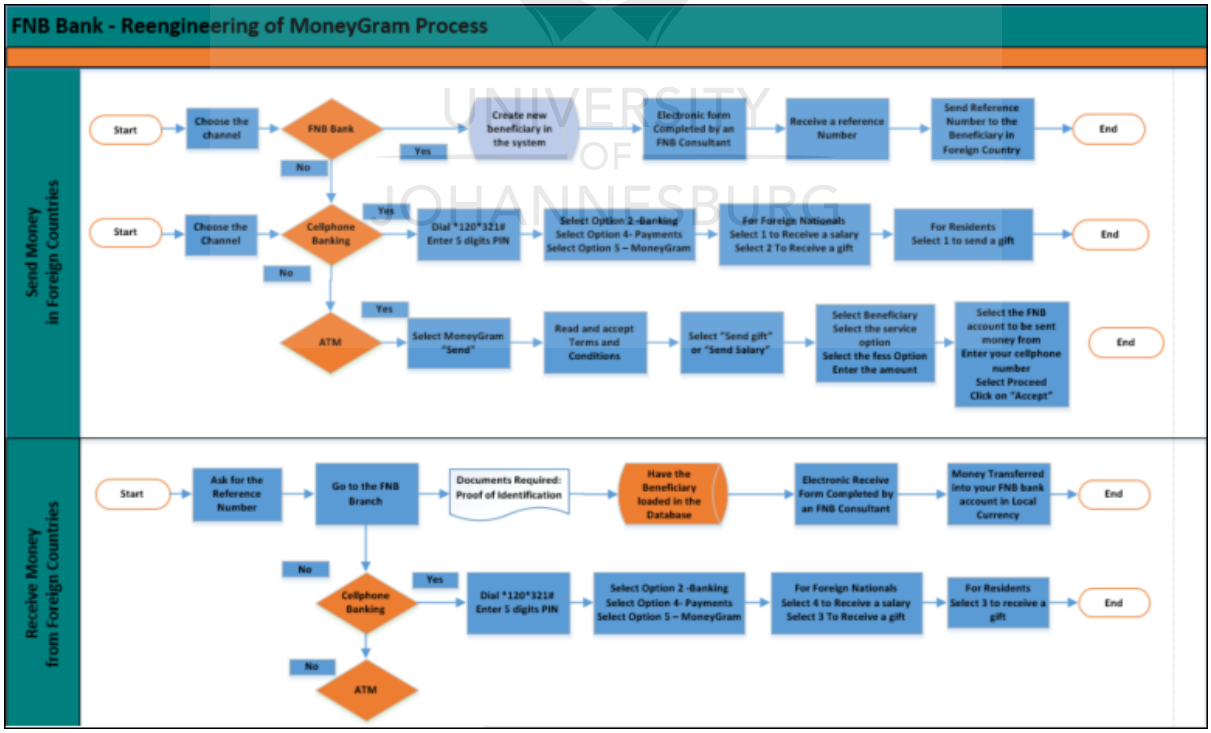


Source: Own Compilation

Figure 6.34: Cyber-attacks process

6.5.19 FNB Bank – Reengineering of MoneyGram Process

Figure 6.35 shows an example of a reengineered process of applied at the FNB bank namely MoneyGram process for both sending and receiving. This reengineered MoneyGram process emphasises on the use of omni-channels that a customer can use to complete one banking transactions.

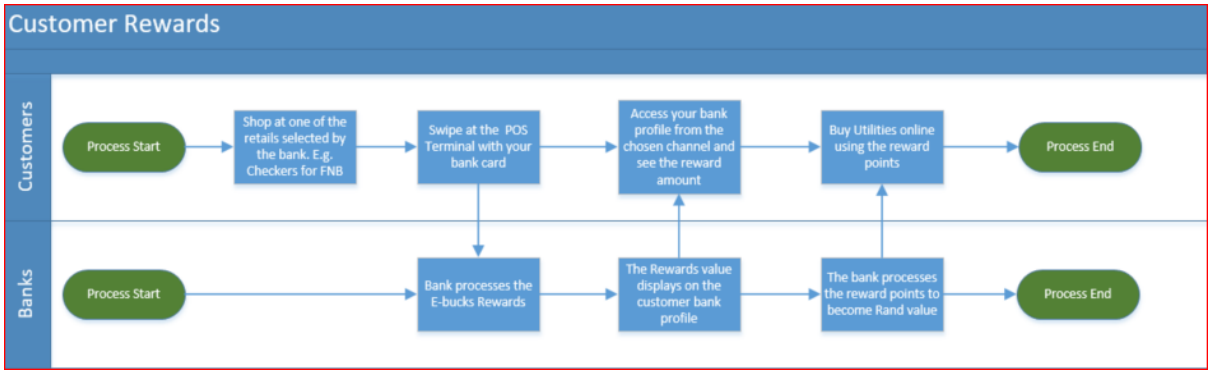


Source: Own Compilation

Figure 6.35: FNB Bank – Reengineering of MoneyGram process

6.5.20 FNB Bank – Customer rewards (Ebuck)

As part of the customer experience program, FNB offers Ebuck rewards to customer shopping at Checkers for instance.

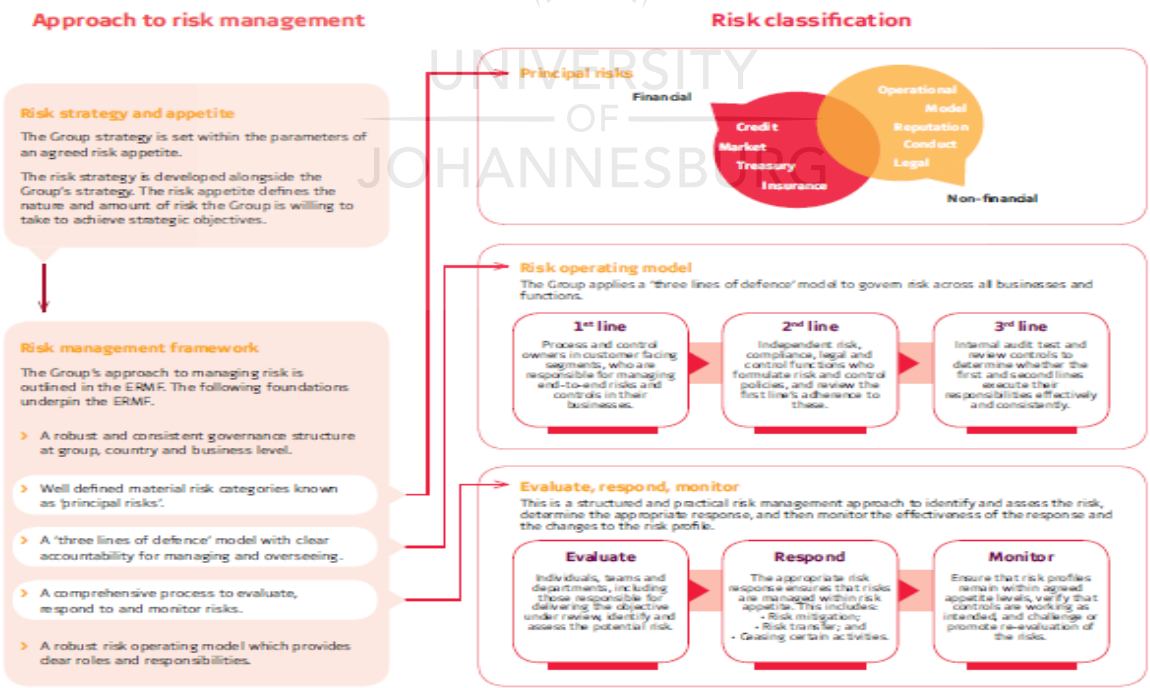


Source: Own Compilation

Figure 6.36: Customer reward process

6.5.21 Absa Bank - Reengineering of Risk Management Process

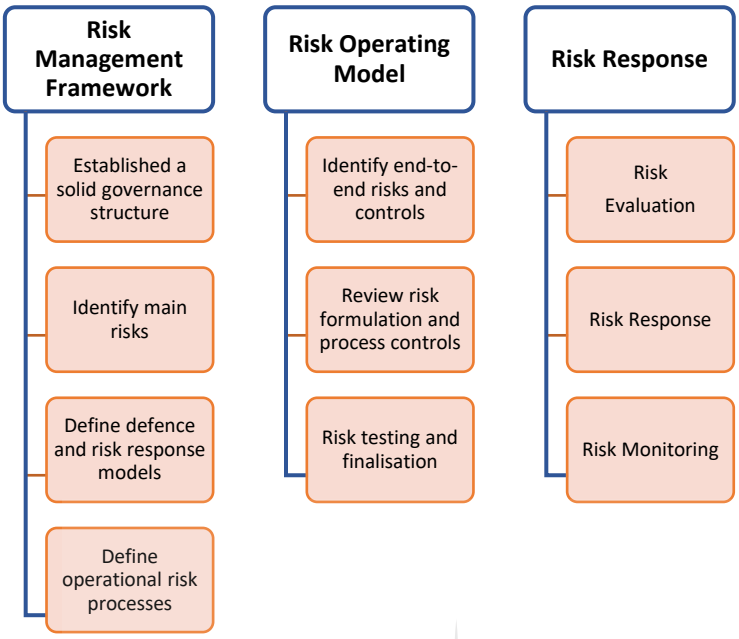
At Absa, a three lines of defence model namely risk management framework, risk operating model and risk response is applied to mitigate risks across the business to minimise risk impacts on the productivity. Streamline customer processes – treating customer fairly.



Source: Absa Bank (2020)

Figure 6.37: Risk Management process

6.5.22 Absa risk management model



Source: Absa Africa (2019)

Figure 6.38:Absa risk management model

6.5.23 Anti-Virus Installation Process

Source: Own Compilation

Figure 6.39: Absa Bank – Installation of Anti-Virus process

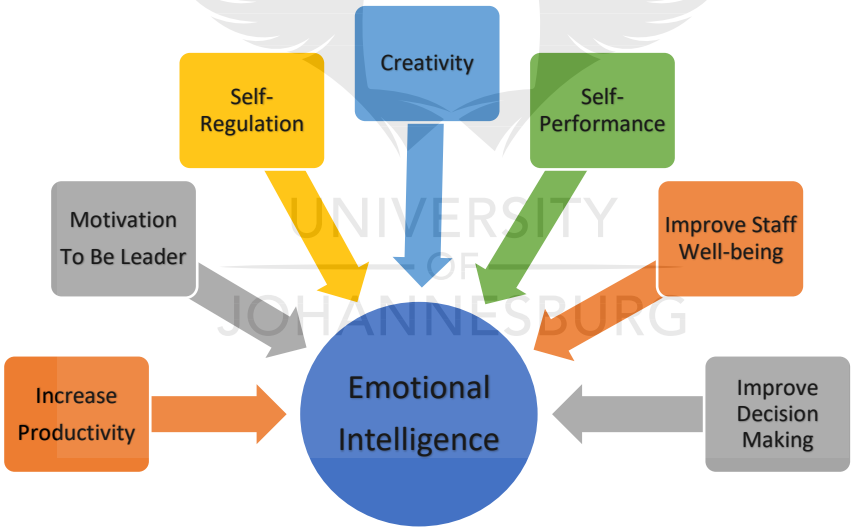
6.6 Digital Change Management

Evidence show that digitalisation brings a lot of change. Whether positive or not, stigmatisation has been developed around the digitisation because of the numerisation and the introduction of intelligent machines.

Emotional intelligence

Emotional intelligence is one of the faculties that digital natives as well as existing people need to develop in order to fit in the unstable environment full of continuous change. Emotional intelligence is a discipline that includes self-awareness, self-management, social awareness and

Social skills. The use of emotional intelligence has produced considerable benefits that drive the leadership position that organisations have on the banking industry in South Africa. Figure 6.40 below displays results of best practices namely productivity increase, leadership motivation, self-regulation, creativity, self-performance, well-being and decision-making improvement. Emotional intelligence is one of the key aspects required in the fourth industrial revolution to boost human adaptation since the speed of change is higher than the rhythm of knowledge acquisition. Therefore, people should develop self-awareness, self-regulation and self-performance in addition to social skills, empathy and motivation to survive in the new digital environment. All stakeholders need to develop emotional intelligence to handle digital transformation and environmental change through skills development, leadership capabilities improvement, reduction of operational stress and ultimately the improvement of internal peace in the work environment. Since each evolution and revolution comes with new emerging jobs while the existing jobs might become completely obsolete or required adjustments via training and upskilling. At corporate or organisation level change can require a massive redeployment of new management solutions.



Source: Author's Compilation

Figure 6.40: Emotional intelligence at FNB Bank

Although the averment of digitalisation has created change in many areas of business management, the truth is that some aspects cannot be automated or managed by intelligent machines. The following skills will remain manual or human-related to ensure execution:

Leadership: Company' leadership is defined by the top management through definition of relevant strategies to ensure competitive edge and market positioning.

Ethical considerations: From moral values such as Honesty, loyal and integrity to collaboration, only human being can be responsible for the enforcement of such values.

Innovation, ambition and creativity: Innovative capacity can only be instated by human being in a sense that it requires combination of market analysis and future planning skills in addition to adaptability and flexibility.

Skills Update: Facing the 4.0 IR is all about skills update through acquisition of tech-related training or short courses. As new technologies rise up, so does the need of appropriate skills to tackle the need. At a time, students who hold degrees from the universities are not equipped enough to handle ICT need in organisations. That is why corporates should partner with professional bodies to upskill the workforce and keep their knowledge acquisition up to date.

Professional Development: The institute of Chattered IT professionals South Africa (ICITPSA) is a professional body that provides ICT courses to both individuals and organisations. Technology assessment and security levels lead long-term survival and sustainability in the country.

The change context: Employees should be trained on how to follow security policy, identify suspicious e-mails whether with attachment or not, fake adverts and so on and immediately report to the management. Microsoft (2019) revealed that 112 000 new jobs will be created in South Africa with the rise of cloud computing and the creation of Microsoft cloud society program aimed to support people to become Microsoft azure export.

Government regulations: In south Africa, it is for the government to give a spectrum allocation for any new technologies to be implemented and thus provide services.

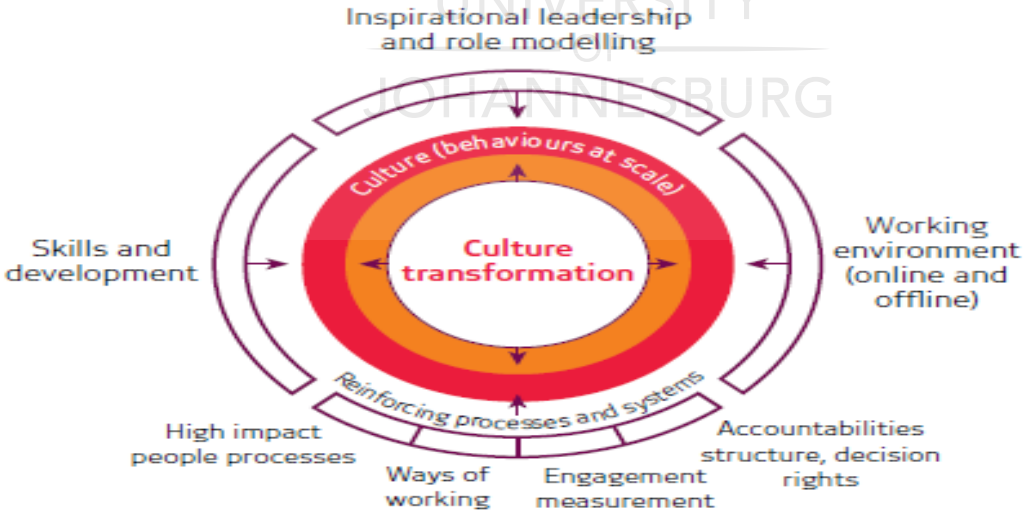
6.6.1 Change Management at Absa bank

Capital and Risk Management: Absa implemented the Basel II requirement on risk management practices since January 2008. The Basel II accord settled by the Basel committee on banking supervision promote the three pillars to strengthen and stabilise the banking system in South Africa namely minimum capital requirements, market discipline disclosure and supervision review. Absa bank offers business insurance and cover against potential dangers like fire, theft, flood and so on. Insurance to protect business assets and Insurance to protect business values through payment of outstanding bank loan. Surety Solution to make further payments on bank loan without affecting existing estates and Buy-and-sell solution to purchase shares of a deceased business partner. Insurance allows to protect the future business against

fiduciary services such as Wills to ensure that customer wishes are manged legally, trusts by facilitating protection of wealth and estates through administration of deceased estates.

Digital Disaster Security Risk: Digital transformation goes in hand with the dependence on internet connectivity and the use of mobile application to access banking transactions. This suggests that an internet interruption can generate losses and lack of productivity. Sometimes at the end of year 2019, Absa could not deliver financial services to their customers due to a loss of service on their banking application as well as loss of internet connectivity. Luckily, Absa' engineers worked hard to restore services at full and efficient capacity. Absa bank has been prepared to prevent and limit country disaster in case of no electricity by using renewable energy to produce electricity. Absa bank equally use this opportunity to increase customer experience through online self-training on how to use renewable energy at the home level.

Bank Culture: Absa strives in creating entrepreneurial and innovative culture following the below holistic culture transformation framework. Digital culture transformation is predominantly about reinforcement of business processes and systems understanding through skills and development in addition to evolving people' behaviour at scale through better work environment whether online or offline. A successful culture transformation depends on high impact people processes, ways of working, work engagement and the accountability structure and decision -making rights.



Source : Absa Annual Report (2020)

Figure 6.41: Absa Culture transformation

Although Islamic banking is new in South Africa, Absa bank has received international awards in 2006 for best practices on Shari'ah deal and another award in 2007 for a conventional bank

offering significant Islamic banking products on international market. Later on in 2009, 2010 and 2011, Absa equally earned a significant recognition by the global fiancé magazine as best Islamic bank in Africa and the Middle East (Absa, 2019).

***Legal Compliance*:** Absa bank publishes the latest version of legislation, protocols, policies and regulations to enable a conducive agricultural environment. Smart devices must be EMV PCI DSS certified. Absa bank complies with the following policies and regulations as established by the South African Reserve Banks (SARB) and the government namely legal and compliance, terms of use and banking regulations as elaborated below.

Privacy policy: Absa bank is committed to ensure customer privacy because customers have rights in terms of applicable data privacy legislation. However, Absa bank can share customer' privacy only with an objective of improving products and services offered to customers.

Terms of use: Terms of use is one of the legal and compliance elements for customers to follow the terms of use of the websites, products and other communication channels. Following terms and conditions applied at the bank, users have right to privacy, use of the sites while bank has intellectual property rights, access to the third-party websites and material in addition to sharing social networks contents.

Email Disclaimer: Sender and receiver are both complied to the terms of email disclaimer through this statement: "The information contained in this communication is confidential and may and may be legally privileged'.

FICA Information: The FICA Information Act was introduced in South Africa in 2001 to support financial institutions to fight against financial crimes such as money laundering and terrorist activities.

Encryption Software: For online banking security purposes, Absa bank uses and complies with the international encryption technology standards that consists of using bit encryption built into the browsers.

Renewable Energy: Absa bank delivers and publishes renewable energy reports under the supervision of the centre for renewable and sustainable energy studies.

Banking regulations: Absa bank complies with the following regulations:

- BEE (Black Economic Empowerment) to promote socio-economic transformation to achieve stability and growth.

- Corporate Governance for stakeholders to ensure that mission and vision of the organisation are met in addition to the core values. The principles Basel rating, Ombudsman for banking services, code of banking practice, dispute resolution and the National Credit Act are applied.
- Administration information to value the administration of the bank according to the defined purposes. Registered office, group secretary, transfer secretary, auditors and sponsors are the stakeholders contribute to achieve administrative communication.
- Education and skills development to improve employment opportunities and reduce poverty and inequalities.
- Enterprise development to promote economic sustainability and growth of small and medium enterprises.
- Financial inclusion to facilitate access to financial services through financial education and awareness programme.

South African bank abides have to follow other legal and compliance related to browser requirements, cookies policies, regulatory declaration, personal and business client agreement together with the promotion of access to information Act (PAIA).

Shari'ah Law: Absa bank offers Islamic banking services following the Shari'ah law and its application in financial economy. The Shari'ah Law is defined by the independent supervisory board that also guide and advise on its implementation and daily execution. The Shari'ah guidelines stipulates that Riba also known as interest is prohibited in terms of Islamic law. This suggests no interest applied during Absa Islamic banking on products and services. The particularity with Islamic banking is that no Riba is applied on banking products and services, on account transactions and no overdraft facility on cheque account. An Islamic banking debit can be used for transaction locally and internationally with only administrative fees to be charged. Profits are calculated on the average daily balance and capitalisation takes place at the end of the fiscal year. Money in the Islamic TargetSave account is invested in Shari'ah compliant financing and investments. The generated profit is later on shared with the account user using a competitive profit rate. Islamic vehicle finance fully complies with the Fiqh Almua'malat also known as the Islamic commercial jurisprudence.

6.6.2 Change Management at FNB bank

Bank Culture: Top management and executives are to be the leaders who will drive the road map of digital change at the bank. Just like the C-suite drive the overall strategies of the

organisation, they are also responsible in alignment new strategies and culture to improve implementation. More than before, FNB bank is developing customer loyalty through continuous and efficient engagement practices to collect their new expectations. The FNB bank has more than 15 thousand of employees across South Africa as published by LinkedIn (2019). It is beneficial for banks to develop personalised culture that is unique for the business to improve differentiation. Digital-driven strategies have transformed business culture in companies as well as financial institutions like FNB bank. In addition to promoting entrepreneurship to grow Africa, FNB rewards both customer through specific shopping and their owner-managers with outperformance bonuses.

Compliance: FNB bank holds an authorised financial services and credit provider number NCRCP20. As displayed on the FNB website, FNB are compliant on specific conditions and responsibilities that drives the business. Legal matters, International compliance, product terms and conditions, promotions terms and conditions. FNB ensures social responsibility through funding and voluntarism. FNB complies with the 2025 vision defined by the South African Reserve Bank (SARB) that consist of nine industry goals such as promoting competition and innovation, financial inclusion, regional integration, cost-effectiveness, financial stability and security, interoperability, flexibility and adaptability, a clear and transparent regulatory and governance framework as well as transparency and public accountability (SARB, 2019). Additional policies from the social media and Web hosting domain policies.

6.5.3 Digital Change Management at Nedbank

Customers now require having enough space in their smart devices in order to download all application offer by the bank. They first need to have App store or Google pay to be able to download bank' applications.

Bank Culture: Nedbank has developed an inclusive culture of becoming a pan-African bank and being the premier financial service provider in South Africa. Nedbank thrives for a transformation approach through delivery of effective digital banking services, strengthen governance and risk management.

Digital products and services: Change management at Nedbank starts with the creation of new products that meet digital requirements. In doing so, Nedbank designed several products and services such as online banking, money App, Nedbank App, Nedbank smart devices among others.

Upskilling Staff: Bank staff were used to the traditional way of delivering banking services that required customer to go to the branch and have face to face conversation with the consultants. Currently, digital transformation has changed banking transaction processes through use of the internet of things, digital products and services in addition to remote assistance. In order to remain productive, Nedbank now needs to upgrade the staff knowledge through training and upskilling. The introduction of digital courses in the academy will enrich digital knowledge acquisition.

Green Contribution: Nedbank ensures protection of the environment following specific approaches, operational footprint, sustainable development guides, stakeholder engagement and responsible finance. Furthermore, Nedbank has created the greenbacks as a form of reward to customers that use eco-friendly products.

Security needs: The increase of internet connectivity worldwide has open doors to cyber-attacks and data breaches. From individual to businesses, security awareness is the bottom line of self-protection and business efficiency. Employees measure the impact of connecting their own devices to the company network.

Compliance: As a financial institution, Nedbank complies with the following legislation, acts and regulations to meet SARB' requirements. It is important to note that compliance approaches are continuously reviewed to remain up to date.

Self-certification Status: Individuals or entities that do business with Nedbank must complete the applicable self-certification form to confirm if they have tax obligations, liabilities and residencies outside South Africa. Nedbank has the obligation to report it to the SARB.

The Financial Intelligence Centre Act (FICA): The FICA came into the game in 2003 to fight against financial crime especially tax evasion, terrorist financing activities and money laundering.

The South African banking risk information (SABRIC): Created on the 25 March 2015, the SABRIC stated that the account should be frozen if the FICA information and documentation are not up to date. Hence the obligation to let the bank know when information such as contact details, email address and physical address changed.

Fraud awareness: Nedbank has the duty to inform customers about type of frauds happening in the financial market to limit collateral damages. Nedbank also use the private notice to inform customers about how their personal information is used to optimise customer

satisfaction. Additionally, credentials of customers will never be shared without their consent. Other information can be collected from the other financial institutions, public databases, credit bureaus, fraud prevention agencies and data aggregators.

South African Fraud Prevention Services (SAFPS): In conjunction with the SAFPS, Nedbank combats identity theft though regularly checking done by both the bank and the retailers before credit approval for instance.

Relationship between Nedbank and its customers are managed under specific rules and policies such as CRS (Common Reporting Standards) client communication, disclaimer and Nedbank' statement of commitment to the forex global code. Report unethical behaviour, FAIS conflict of interest policies and Terms and conditions per financial products.

Learning new skills: Traditional things are becoming obsolete over time considering the level of change linked to the fourth industrial revolution. This suggests that people should develop learning skills to manage and bring new technologies together. Knowledge acquisition is the key enabler of analysing and managing the impact and benefits associated with the 4.0 IR in order to reshape business and society as a whole.

6.6.4 Change Management at Standard bank

Bank Culture: STD band preconises data-driven culture that highlights the importance of data management for analytics and business efficiency. Considering the poor life conditions in South Africa, STD bank in conjunction with the department of human settlements is committed to offer affordable home loan.

Digital products and services: Standard bank releases monthly articles in which they publish information related to the daily life with the bank. For instance, the recent article was about how to plan studies overseas.

Employee development: Employee development and training is one of the keys principles applied at STD bank since adaptability to the digital world relies on continuous learning and progress. Employees participate to the management and leadership programme locally and beyond for empowerment purposes. STD bank graduate programme prepares scholars to learn about corporate system and on the job training. The Leadercast programme has an aim of upskilling top management through international exposure by means of conferences and business school programmes. Opportunities are given to retiring senior executives to become coach in guiding the new generation of staff. Voluntary employees can request for academic

bursary to further with studies in the tertiary intuitions. In the meanwhile, undergraduate and postgraduates benefit from financial support to sponsor their studies.

Sustainable Development: As part of the core business activities, STD bank embed social, economic and environmental (SEE) impacts in all business decisions. From the concept of "Africa is home" to the commitment of creating value over time, STD bank operates in many areas to comply with the sustainable development requirements namely financial inclusion, infrastructure, job creation and enterprise development, Africa trade and investment, education and skills development, employee development and training, STD bank is now a member of the UN principles for responsible banking that has a mission of driving sustainable development and guaranteeing the prosperity of the present and future generations. The UN principles drive change through alignment, stakeholders, impact & target settings, governance & culture in addition to transparency & accountability to ultimately make an impact.

Compliance: To meet sustainable development objective, STD bank complies with UN's global sustainable development goals, the African Union's Agenda 2063 and finally the South Africa's National Development plan. All financial institutions in South Africa comply to the BEE requirements to achieve equitable and inclusive education, skills development, job creation and enterprise expansion to reduce inequality in the country.

Broad-Based Black Economic Empowerment
Generic Verification Certificate

Certificate No: GEN L1/7951/200219/4

Standard Bank of South Africa Limited

Refer to Annexure A for entities covered by this scorecard

Reg No. 1962/000738/06, **VAT No.** 4100105461

Head Office, Location: 5 Simmonds Street, Johannesburg, 2001

Verification Standard Applied: Amended Financial Sector Code

Scorecard Applied: Generic

Element:	Element weighting:	Score:
Ownership	23	23.81
Management Control	20	14.86
Skills Development	20	17.62
Preferential Procurement	15	18.83
Socio-Economic Development and Consumer Education	5	7.11
Empowerment Financing and Enterprise and Supplier Development	25	20.88
Access to Financial Services	12	11.42
Total Score:	120	114.56

B-BBEE VERIFIED BY MOSELA & SIZWENTSALUBAGOBODO RATING AGENCY

Broad-Based BEE status Level	:	Level 1
BEE Procurement recognition percentage	:	135%
Black Ownership percentage	:	22.20%
Black Women Ownership percentage	:	9.59%
51% Black Designated Group	:	No
Empowering Supplier	:	Yes

For: Mosela and SizweNtsalubaGobodo

Date of issue: 20/02/2019
Expiry Date: 19/02/2020

Source: Sustainability Standard Bank (2020)

Figure 6.42: STD bank B-BBEE Certificate

6.7 Digital Banking Performance

More than before, shareholders are very curious about data assets management as one of the crucial master data in this era of data analytics and big data analytics. Bank performance is no more measured by only the ration of return on investments and return on assets but with consideration of data assets as well. Performance of commercial banks are driven from their portfolio of financial services and insurance offered to customers. Standard financial services such as retail banking; lending and borrowings; corporate and business banking; international and mortgage banking; insurance services among others that are offered by commercial banks have moved from the traditional approach to the digital tendency through mobile and online banking. Digital banking performance can be measured by both non-financial and financial indicators. Non-financial metrics are measured by strategic, capital, digital, social and environmental performance following specific reporting standards and frameworks such as:

- Johannesburg Stock Exchange listings requirements
- International financial reporting standards (IFRS)
- King IV report on corporate governance for South Africa (King IV)
- The amended B-BEE financial sector code
- The GRI G4 standards, financial sector supplement and the greenhouse gas protocol
- South African banks Act No 94 of 1990
- Basel III and other regulations
- The Previously Carbon Disclosure Project (CDP)
- The United Nations Sustainable Development Goals
- Company and bank Acts
- IR framework of the international integrated reporting council
- Sustainalytics
- Equator principles
- Global reporting initiatives

Financial indicators are measured by the following aggregate and ratios:

Return on Equity (ROE): Return on Equity (ROE) ratio is the ratio that allows to ultimately measure the efficiency of banking business transactions. It also shows that business can well-managed the money that shareholders invested in.

Cost-to-income (CTI) ratio: This ratio measures efficiency of business to generate revenues relative to the costs. The less the ratio the better is the business in making profit.

Credit loss (CL) ratio: This ratio measures impairment charges as a percentage of average loans and advances. It also tells about the incapacity of clients to pay back the loans and the impact of lower charges across the business.

Total Capital Adequacy ratio

This ratio measures the solvency that assesses the capital strength against risk-weighted assets (RWA). Common equity tier 1 ratio

Headline earnings: It shows the profit that business can generate while managing costs and risks.

Volume of Assets: This financial term is used to measure the size of an organisation or institution.

Risk Quality Management

Sustainability of banking performance also relies on risk quality management and the use of appropriate measurement to evaluate and mitigate potential business risks. Banks use risk measurement techniques such as stress testing, tail metrics, value at risk, scenario analysis and back testing to measure business risks in the expected economic environment and the adverse economic conditions considering the defined risk appetite. Nowadays, standard or traditional risks are combined with emerging risks associated with the digital disruption. Banks should be aware of digital risks while implementing digital change.

Standard Risks

The following risks are effectively mitigated at Standard bank to develop the risk-awareness culture:

Reputational risk occurs when potential damage or data issues affects the market image and thus impair the profitability and the sustainability of the business.

Country risk: Also known as cross-border country risk, it measures the uncertainty the obligors will be able to fulfil their obligations considering the given political and economic conditions in the country of host. Co-financing and international commercial insurance can help to reduce such risk.

Business risk happens when losses are caused by operating revenues not balancing operating costs. Banks need to increase the ratio of variable costs which creates flexibility to reduce costs

during economic recession. Additionally, monitoring the profitability of product lines and customer segments as well as be alert and responsive to market changes locally and abroad.

Liquidity risk occurs when an entity although solvent cannot generate enough cash resources to fulfil its payment obligations on due date. Banks should undertake continuous liquidity stress testing and simulate scenario analysis while monitoring early warning of liquidity indicators.

Market risk is the risk of sudden market value of future cashflows, commodities currency exchange and interest rates affecting credit recovery and market movements. It is wise for banks monitor daily market change for efficient trading operations.

Operational risk happens when loss is resulting from operations such as people, systems internal processes and external business events. This type of risk includes tax, legal, environmental, IT, information, cyber, model, compliance and social risk.

Insurance risk: The risk that future experiences relating to claims, expenses, policyholder behaviour and investment returns differ from the assumptions made when setting premiums or valuing policyholder liabilities.

Traded market risk: The risk that we would be impacted by changes in the level or volatility of positions in trading books, primarily in investment banking.

Non-traded market risk: The risk of our earnings or capital being reduced due to the market risk exposure from banking book positions which may arise net of hedging activities.

Digital Emerging Risks

Besides the above standard risks, there are emerging risks coming with the technology increase namely technology, cyber and regulatory impact risks. Standard bank has identified the risk drivers in order to establish solid mitigants.

Technology Risks: The bank is exposed to technological risk when it cannot define solid measures to evaluate and to maintain an agile and secure technology change. Technology risks are driven by multichannel of communication that required continuous updates and upgrades to avoid scams and frauds attacks. Devices, products and services have specific technology span applied to them meaning that appropriate security postures should be put in place to avoid hacking. The bank' safety lies on the continuous upgrade and testing of all security systems while maintaining an agile change implementation approach.

Cyber Risks: Technological upgrades also enhance online risks that lead to financial loss, data loss and network issues when the bank is not aware and cautious. Remote technologies open doors to cyber-attacks and network penetration. Fraudsters mostly have system that are more sophisticated than the security systems at the bank. The bank should use advanced methods such as artificial and emotional intelligence to track criminals. Additionally, terminal devices should have unusual transactions sensors to quickly detect cyber vulnerabilities.

Regulatory impact risks: The bank can go through financial losses and reputational risk when regulatory requirements are not met. Continuous change of bank regulations is not cost-effective and negatively affect financial service delivery. South African administration and the SARB should work in hands with the banks to implement evidence-based policies and to monitor international change impacts.

People risk: less experience and inadequate staff can cause enormous risk to the business since they cannot delivery good service to the customers and cannot identify potential operational risk. Learning and skill development are the right approach to ensure business safety and easy change management.

Information risk: Business data has become the most important asset to protect against breaches and inaccuracy. It is capital for banks to develop information protection culture in line with the POPI Act.

Business disruption risks: The current unstable environment drives continuous change and need for adaption. At any time, the core business can be disrupted due to environmental, technological or infrastructure change. Dependence to natural resources such as water, power utilities and network providers is the foundation of multiple business risks. Solutions reside on developing agile business approach, customer experience and simplification of IT landscape.

Environmental risks: The race towards profitability increase bring organisations to augment productivity that sometimes cause potential threat on living organisms and the environment through emissions of bad gas, wastes and resource diminution.

Fraud risk: Card fraud losses remain the major contributor to overall fraud losses, but these have improved and stabilised across all Card portfolios. Lending fraud has increased and is being monitored closely.

Financial crime: Satisfactory progress has been made on remediating customer identification and verification issues, customer on-boarding processes, improved customer document

retrieval capability as well as improved suspicious transaction monitoring outside South Africa. Automated processes and controls are applied where possible.

6.8 Macroeconomic Challenges

Sustainable business performances depend on the macroeconomic, social and political environment since they affect market commitments, operating ecosystems and the overall economic development. Therefore, associated risks and the mitigation process should be known for efficiency purposes.

Table 6.5: Risk mitigation

Challenges	**Risk Mitigation**
Global uncertainty	Monitoring and managing risk strategy and appetite
Increasing cost and scarcity of capitals	Monitoring leading economic indicators
Increase of unemployment rate and poverty	Assess the impact of South African sovereign downgrade
Increasing debt burdens and fiscal shortfalls	Engaging with the community
Policy uncertainty	Partner with other economic sectors
Inequality and activism	
Environmental events due to adverse weather	Engaging with internal and external stakeholders through sustainability programmes
The implications of global warming	Engaging with the communities for better life conditions
Global stakeholders influence	Defining strategic alignment of digital products and customer values
	Designing preventative credit and insurance models

Source: Challenges and Risk mitigation

Besides macroeconomic challenges that banks cannot control, there are non-financial indicators that influence banking performance in South Africa namely digital, strategic, socioeconomic as well as eco-friendly and environmental performance.

Financial Previsions

South African banks define financial previsions based on the macroeconomic tendencies disclosed by the governments (Statssa, 2020). This management approach allows bank to prevent any related risks while handling the capital requirements accordingly.

	Ramareality (base case)				Ramaphoria (positive scenario)				Ramaphobia (high-stress scenario)			
	18	19	20	21	18	19	20	21	18	19	20	21
Domestic drivers:	**Limited structural reform** ▪ Fight against corruption continues ▪ Ongoing debate around land, SARB remain (no immediate resolution) ▪ Ongoing policy ambiguity & limited reforms ▪ Moody's downgrade, but discounted by the market & search for higher yields ▪ Eskom – deterioration in finance continues with ongoing bailouts & limited progress on turn-around				**Significant improvements** ▪ Structural reform agenda implemented ▪ Found solutions for land reform without a negative impact on confidence ▪ More market & investment friendly policies ▪ Public finances improving ▪ SA averts a Moody's downgrade & some ratings upgrades from 2020 ▪ Accelerated Eskom turnaround				**Populist pressures lead to unfavourable outcomes** ▪ Land issue leads to rising tensions & social discontent ▪ Significant conflict with anti-Ramaphosa faction & fight against corruption loses momentum ▪ Structural reforms fail ▪ Universal sovereign downgrades – rand under significant pressure ▪ Eskom loadshedding continues & no progress on turnaround			
Global drivers:	**Global environment less favourable than before, but still supportive** ▪ Sentiment swings between risk-on & risk-off conditions				**Highly favourable environment** ▪ Synchronised growth, global trade wars subside & commodity prices gain momentum ▪ Risk-on global conditions				**Adverse global conditions emerge** ▪ Commodity price pressures, increased trade protection, adverse Brexit, heightened global tensions ▪ Risk-off global conditions			

Source: Own Compilation

Figure 6.43: Risk prevention

6.7.1 Digital Banking Performance at ABSA

The financial situation of Absa bank is published every year in various annual reports. Financial indicators were collected from the following reports:

- Absa bank annual reports
- Absa full year results booklet
- Consolidated and separate financial statements
- Consolidated and separate financial statements
- Absa bank annual financial statements

As part of the Absa group, Absa bank information are also disclosed in the results booklet Absa group limited and in the Absa group annual reports. Additionally, Absa' financial reports also display in the Barclays Africa integrated report from 2010 to 2017 when Absa become an

independent bank. South African banks express their financial health using Return on Equity (ROE) ratio every year. Good financial condition is also identified through analysis of the return to assets, total capital adequacy and the cost-to-income ratios.

Financial Performance

Table 6.6 displays financial ratios and financial aggregates that inform about financial condition of Absa bank from 2010 to 2019. The 2019 data are not yet published.

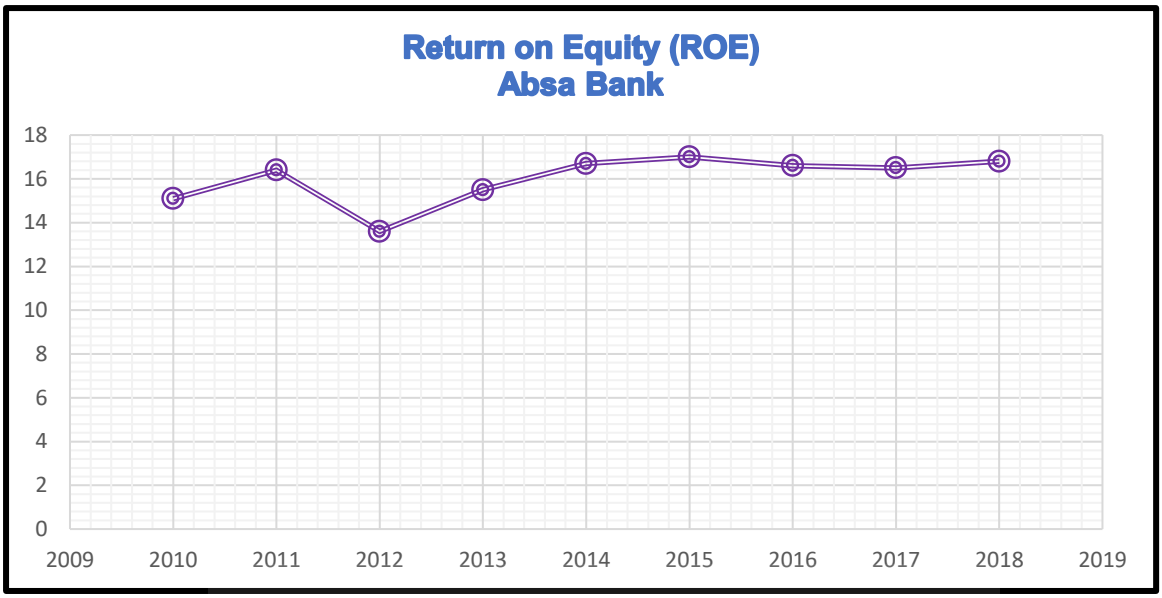
Table 6.6: Absa Financial Statements from 2010 to 2018

Years	2010	2011	2012	2013	2014	2015	2016	2017	2018
Return on Equity (ROE)	15.1	16.4	13.6	15.5	16.7	17	16.6	16.5	16.8
Return on Assets (ROA)	1.1	1.32	1.16	1.27	1.31	1.37	1.34	1.33	1.26
Cost-to-income ratio	56.2	55.5	55.2	54.8	55.2	55	54.5	56.2	57.2
Credit loss ratio	1.18	1.01	1.59	1.17	1	0.86	1	0.81	0.72
Common Equity Tier 1 ratio	11.7	13	13	12.1	11.9	11.9		11.6	12
Total Capital Adequacy	14.8	16.2	17.5	14	14	14	14	15	15.4
Headline earnings		24 334	24 855	10 120	11 067	11 918	12 202	12 650	12 968
Total Assets	500000	50000	500000	819 597	847 901	931224	914669	988 358	1 079 679

Source: Absa Financial Statements

Return on Equity (ROE)

This ratio shows that Absa bank has been experiencing a growing performance since 2010. It equally tells the shareholders about how profitable the money that they invested in the business is. The higher the return on equity, the higher the stock prices. However, the return on equity ratio is efficient when the bank does not rely on leveraging to increase the profit or margins.

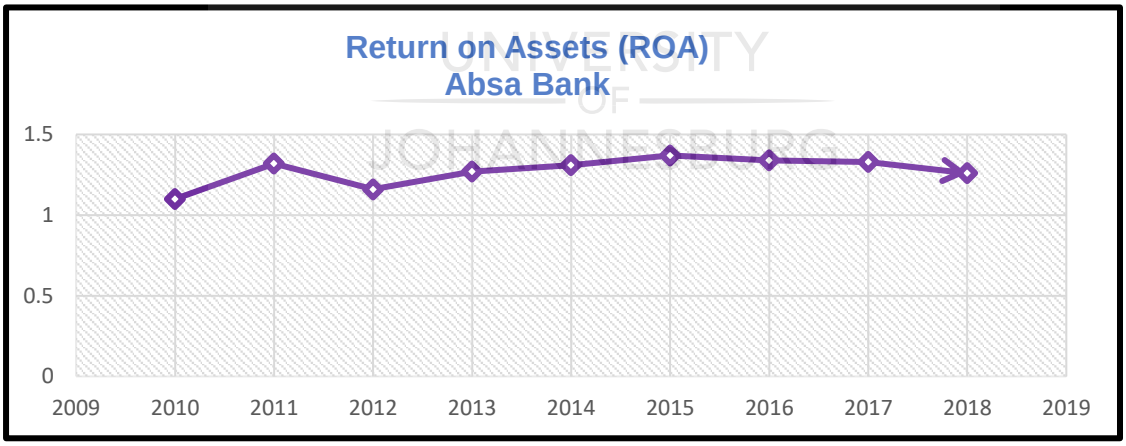


Source: Author's Compilation

Table 6.7: Financial Ratios – Return on Equity (ROE)

Return on Assets (ROA)

This ratio is another indicator of profitability since the net income is more than the average of assets. This suggests that for a bank to remain profitable, ROA ratio should be more than 1 at least. In this case, ROA is more than 1 at Absa bank since 2010.



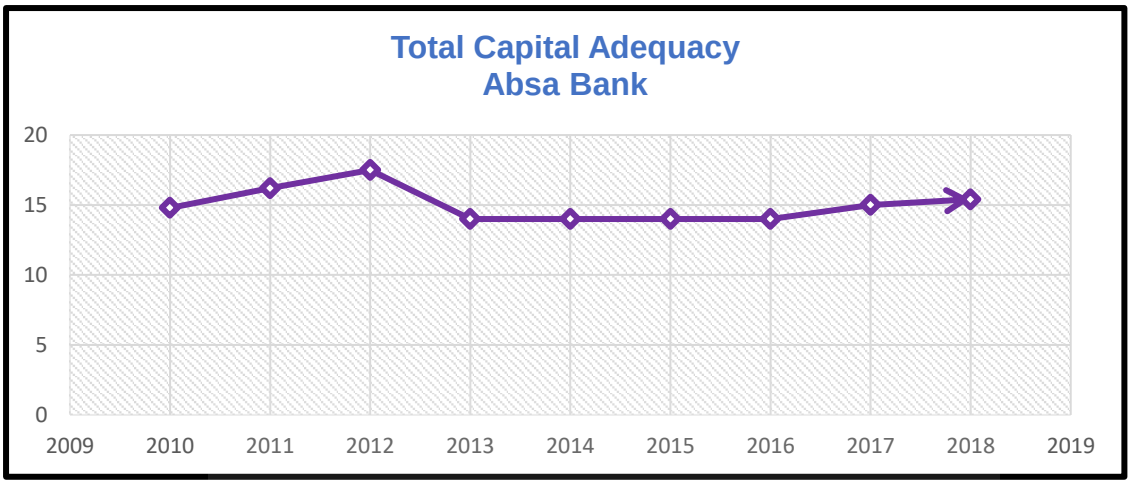
Source: Author's Compilation

Table 6.8: Financial Ratios – Return on Assets (ROA)

Total Capital Adequacy Ratio (CAR)

Also known as a capital to risk weighted assets ratio, CAR ratio tells about how aligned the bank capital to the corresponding risks is. This means that banks should have a minimum capital that can absorb a reasonable number of losses. Following the Basel III requirements,

the minimum percentage of the total capital adequacy should be 8% for a bank to remain profitable. In the case of Absa bank, the CAR has been more than 14% since 2010 as displayed in the table 6.9 below.

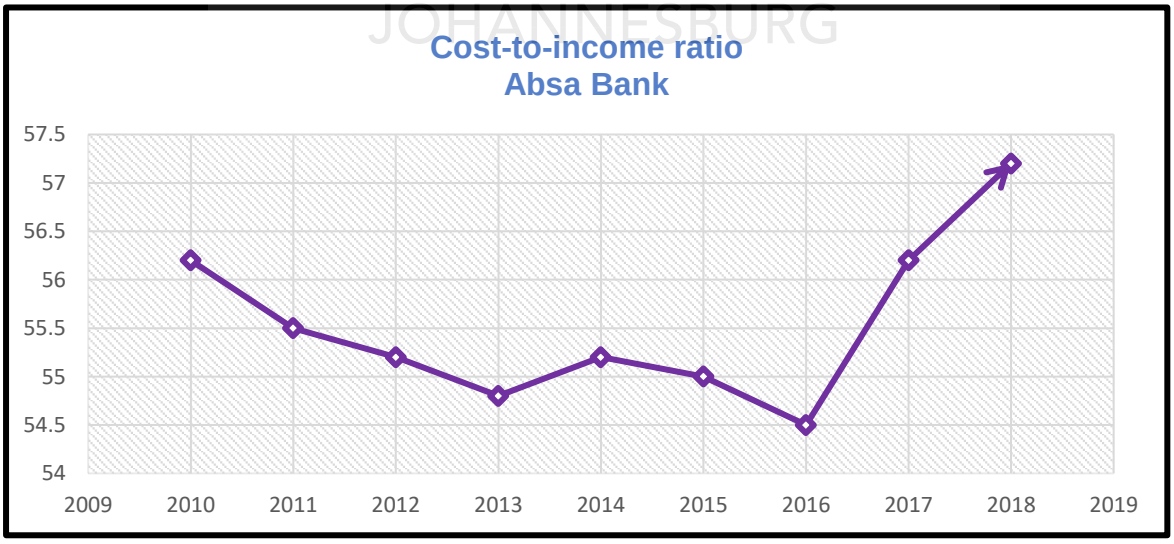


Source: Author's Compilation

Table 6.9: Financial Ratios – Total Capital Adequacy

Cost-to-Income (CIR)

The cost-to-Income ratio tells about bank profitability since it represents the percentage of cost over income in the banking business. This implies that the less the CAR ratio, the more efficient the bank is. Table 6.10 below shows that at Absa bank, the CAR ratio has been more than 55% per year despite a decrease to 54% in 2013 and 2016.



Source: Author's Compilation

Table 6.10: Financial Ratios – Cost-to-Income

Non-Financial Metrics

Non-Financial indicators such as digital, strategic, risk management, socio-economic and Eco-Friendly environmental performance consequently affect Absa' banking performance in South Africa as elaborated in the following units.

Digital Performance

Digital performance is measured by the number of customers doing online banking, the number of ATMs, branches and customers.

Strategic Performance

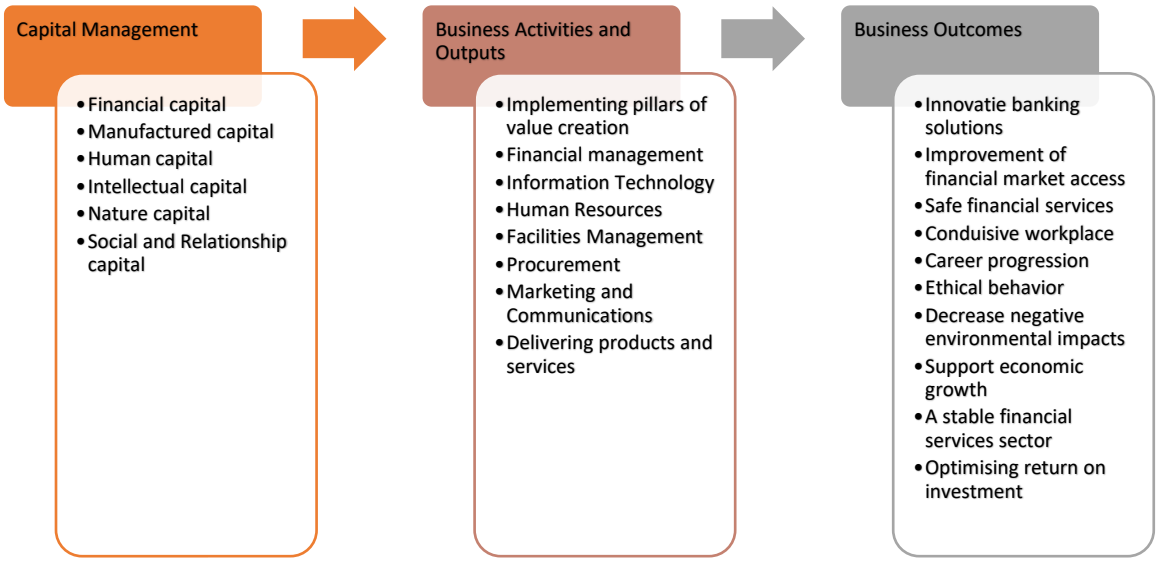
Considering the key role that financial institutions play in economic growth, Absa strive to put in place pillars for sustainable value creation namely governance, rewards, leadership and risk management.

Governance Structure

One of the pillars of value creation is the governance that consists of effective and efficient decision making and oversight done by the board members and the business managers. Any decision-making process is governed by three principles namely corporate citizenship, ethics and culture in addition to accountability and transparency. Top management applies fair remuneration principles and practices, proactive relationship with stakeholders and risk control and prevention. Governance principles are about developing corporate citizenship, ethics and culture as well as accountability and transparency while focusing on business priority such as fair remuneration, improved stakeholders' relations and practical risks and controls systems (Absa, 2019).

Value creating business model at ABSA

Substantial banking outcomes are built by a strong capital management, business activities and outputs.



Source: Absa Annual Report (2019)

Figure 6.44: Absa value creating business model

Capital management: Absa' aim is to transform the six capitals namely financial, manufactured, human, intellectual, natural, social and relationship. Absa stakeholders such as employees, customers, society, investors and regulators.

Socio-Economic Performance

Economic growth: Absa has put solid initiatives in place to support socio-economic growth in South Africa through providing access to finance, offering of training and business strategies to support suppliers and entrepreneurs, assisting small and medium businesses through partnership with others economic operators and providing high-value business solutions for productivity increase.

Education: In 2018, Absa bank offer 2 072 learnerships to black people of which 648 were jobless. Additionally, 2 107 governing body members were trained in financial management and governance from 656 schools in South Africa. 9 298 young people received work exposure, internships and placement opportunities. Absa equally provides strategic funding and educational support to institutions and government agencies.

Employee development: Absa established short and long-term incentives to improve individual performance in addition to retention, deferred and performance awards.

Women empowerment: Absa ultimately contributes to women empowerment since 61.1% of the employees are and 34.9% of them are part of the senior management team.

B-BBEE Requirements: 74% of Absa' employees are black and 49.3% of them belong to the top management. Absa bank holds a B-BBEE level 2, which means that they do business with black stakeholders especially local black suppliers.

Eco-Friendly and Environmental Performance

Environmental contribution: Absa won a green star rating for five buildings in South Africa. Absa is a signatory of the equator principles promoting environmental developments. Absa finances 33 long-term projects under the South African renewable energy independent power producer programme. Absa also closed debt financing of R22 billion for 12 renewable energy projects. Absa strives to reduce carbon emissions, natural resource consumption and pollution in addition of saving water through maintenance of solar photovoltaics. The use of plastics will be replaced by biodegradable materials in Absa campuses that house more than 22 000 employees.

Renewable Energy: The use of renewable energies whether from solar or wind source contributes to improve financial conditions at the Absa Bank. According to the renewable report, low operation and maintenance costs, reduction of electricity bill from local electricity network and decrease of technology cost over time have improved business performance at Absa bank (Renewable energy reports, 2020).

6.7.2 Digital Banking Performance at FNB

Financial performance

Financial metric performance measures at FNB bank comprise financial ratios such as the return on equity (ROE), return on Assets (ROA), Cost-to-income (CIR) and Capital Adequacy ratio (CAR)and cost to income. FNB bank equally defines its performance on digital innovation, strategic approaches, risk quality management as well as social and environmental performance. Table 6.11 below displays financial ratios used at FNB bank for performance measurements.

Table 6.11: FNB – Financial Ratios

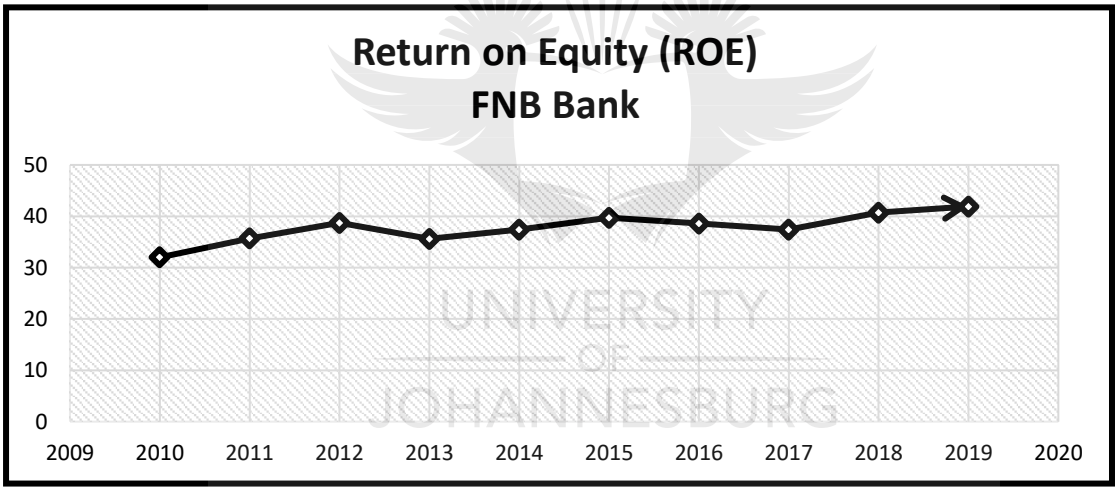
Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Return on Equity (ROE)	32	35.7	38.7	35.6	37.4	39.7	38.6	37.4	40.7	41.9
Return on Assets (ROA)	1.3	1.5	2.78	3.15	3.44	3.43	3.36	3.34	3.53	3.79

Cost to income ratio (%)	60.4	62.2	55.8	54.5	54.7	54.5	54	54	53.5	50.9
Capital Adequacy ratio (%)	15.2	15.6	15.3	15.5	15.7	15.8	16	16.3	16.7	16.8
Credit loss ratio (%)	1.39	0.93	1.28	1.25	0.88	0.79	1.08	1.2	1.11	1.52
Normalised Earnings	4 276	5 022	6 157	7 303	8 712	11 385	12 282	12 947	14 877	1763 7

Source: FNB Annual Reports (2019)

Return on Equity (ROE)

This ratio shows that Absa bank has been experiencing a growing performance since 2010. It equally tells the shareholders about how profitable the money that they invested in the business is. The higher the return on equity, the higher the stock prices. However, the return on equity ratio is efficient when the bank does not rely on leveraging to increase the profit or margins.

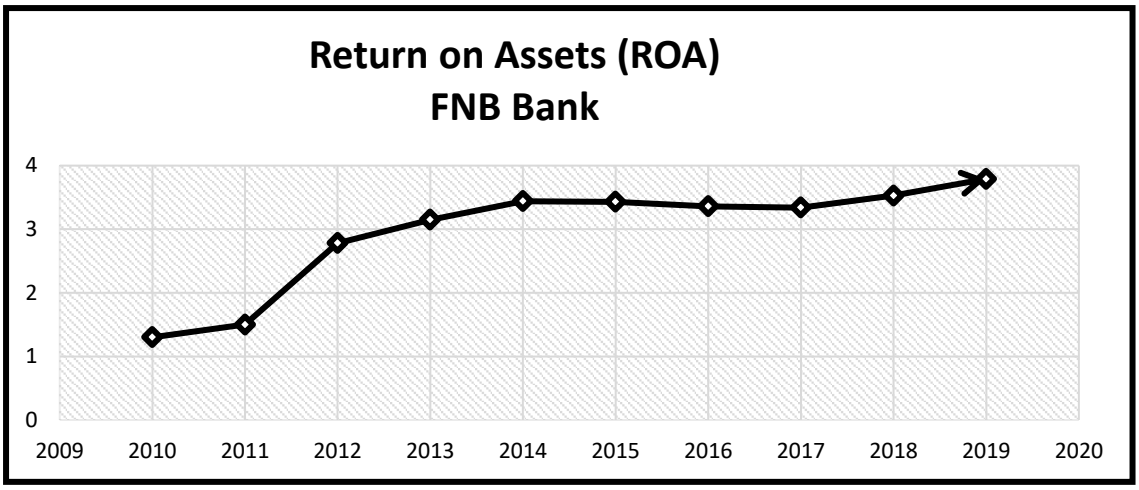


Source: Author's Compilation

Figure 6.45: Financial Ratios – Return on Equity (ROE)

Return on Assets (ROA)

This ratio is another indicator of profitability since the net income is more than the average of assets. This suggests that for a bank to remain profitable, ROA ratio should be more than 1 at least. In this case, ROA is more than 1 at Absa bank since 2010.

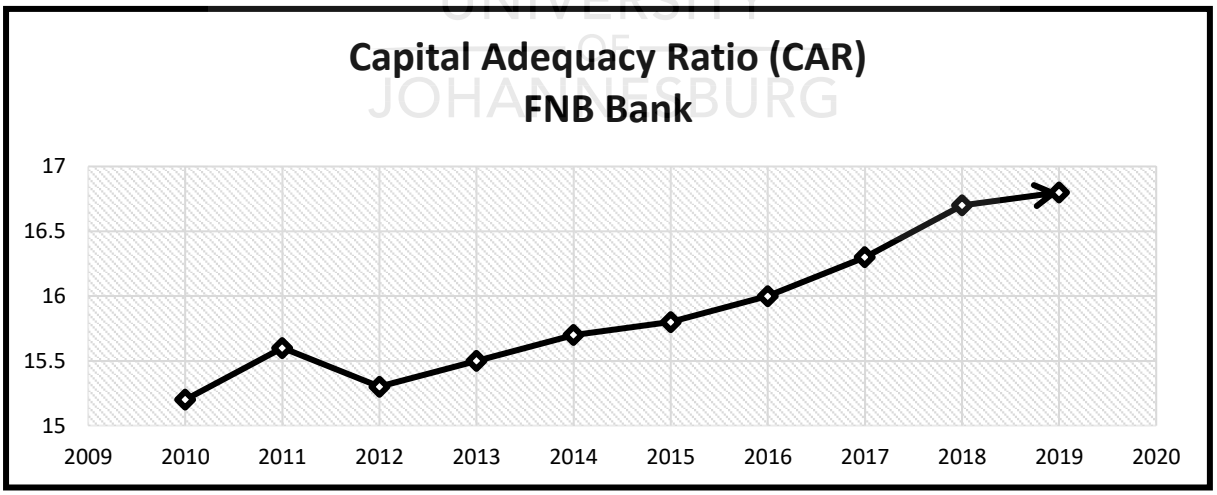


Source: Author's Compilation

Figure 6.46: Financial Ratios – Return on Assets (ROA)

Total Capital Adequacy Ratio (CAR)

Also known as a capital to risk weighted assets ratio, CAR ratio tells about how aligned the bank capital to the corresponding risks is. This means that banks should have a minimum capital that can absorb a reasonable amount of losses. Following the Basel III requirements, the minimum percentage of the total capital adequacy should be 8% for a bank to remain profitable. In the case of Absa bank, the CAR has been more than 14% since 2010 as displayed in the figure 6.47 below.

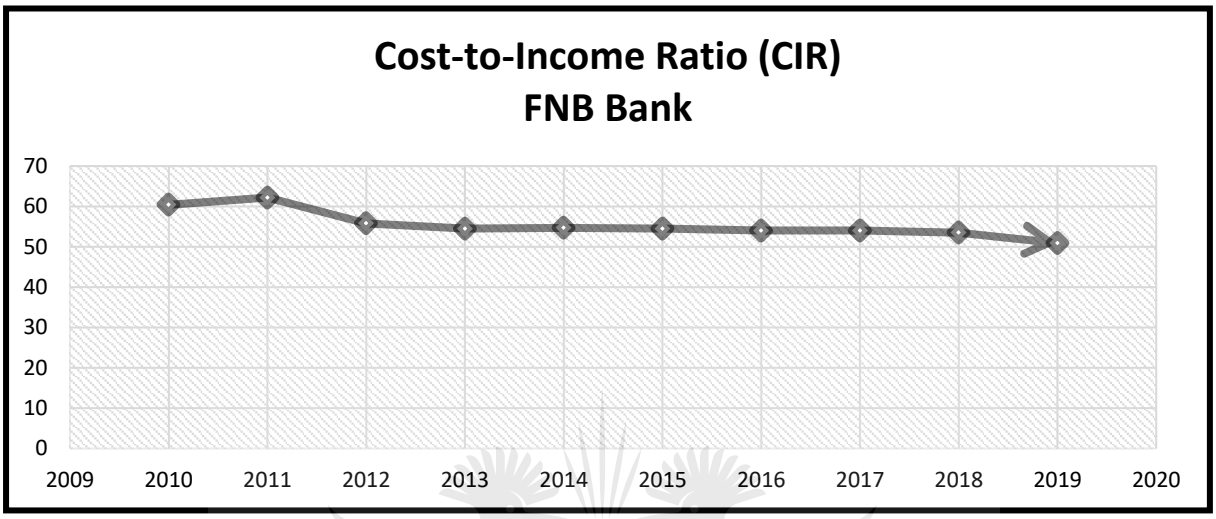


Source: Author's Compilation

Figure 6.47: Financial Ratios – Total Capital Adequacy

Cost-to-Income (CIR)

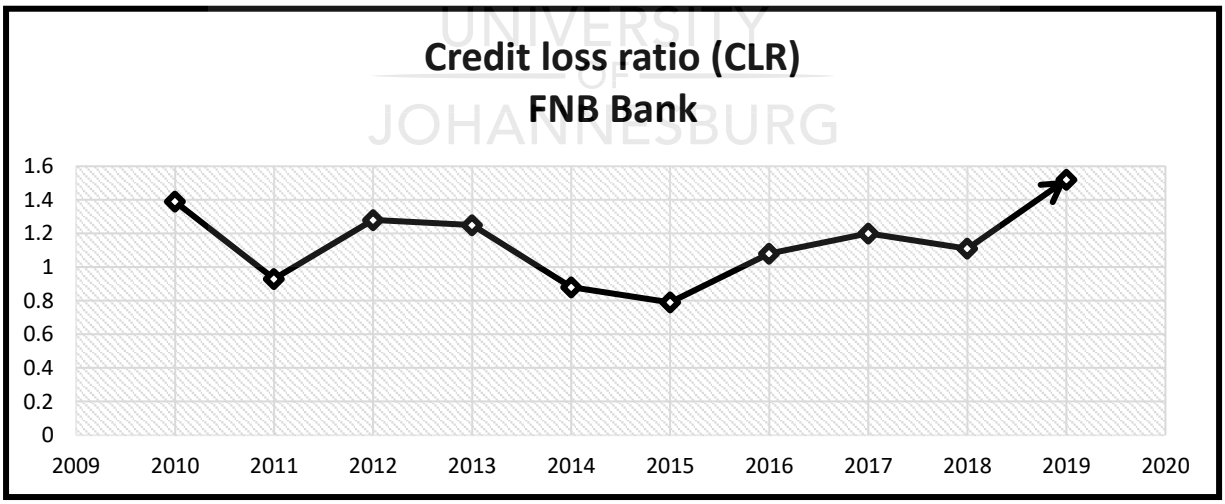
The cost-to-Income ratio tells about bank profitability since it represents the percentage of cost over income in the banking business. This implies that the less the CAR ratio, the more efficient the bank is. Figure 6.48 below shows that at Absa bank, the CAR ratio has been more than 55% per year despite a decrease to 54% in 2013 and 2016.



Source: Author's Compilation

Figure 6.48: Financial Ratios – Cost-to-Income

Credit Loss Ratio (CLR)



Source: Author's Compilation

Figure 6.49: Financial Ratios – Credit Loss (CLR)

The credit loss ratio dropped from 0.88 to 0.76 in 2015 meaning that FNB bad debt has dropped considerably in alignment to the NPLs that equally drop to 2.66 in 2015. Looking back over

the recent decade, FNB has proven consistency on productivity through technological and digital transformation and most importantly risk management. Sustainability of business performance has continuously kept the earning per share (EPS) growth at a better rate leading to the satisfaction of shareholders who further invest in the business. FNB capitalises on growth strategy by seeking for better opportunities in Africa and globally as described while remaining aligned to multiple business dynamics. From the culture of keeping leadership in the banking sector in South Africa, FNB has impressively increased the business portfolio to satisfy all stakeholders in a broad geography. Hence, multiple business and industry awards that position the bank at the top rank for future development and success.

Non-Financial Metrics

Digital Bank Performance

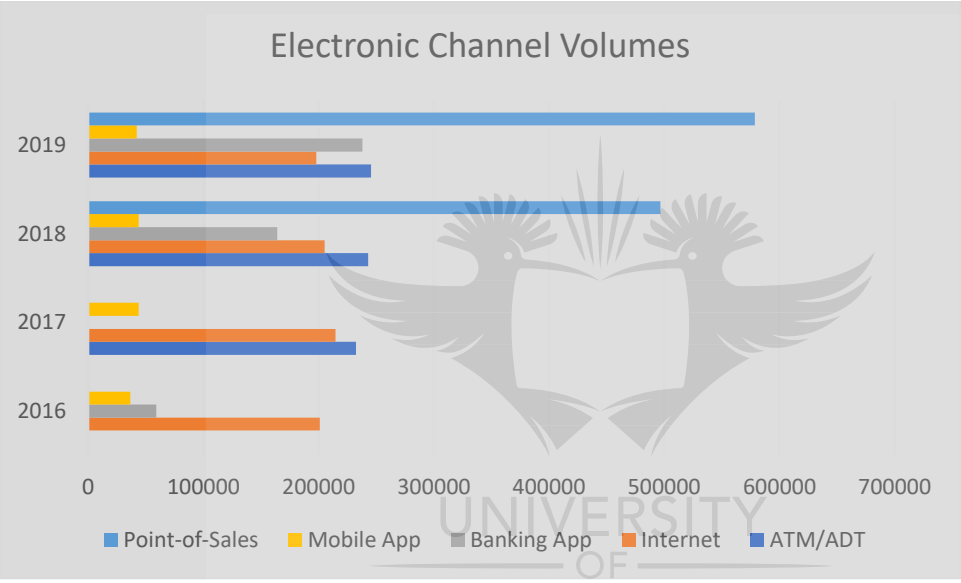
In 2016, FNB established new digital channels such as technology conferences and innovation hubs to improve channels of communication with customers. FNB offers digital products such as instant accounting, instant cashflow, instant payroll and instant invoicing in addition to merchant analytics to business customers to improve their financial management. Such management solutions are proven to be efficient in increasing business productivity and profitability. FNB applies the zero-tolerance policy to fight against fraud and risks linked to criminal activities. FNB specifically focus on electronic banking transactions using powerful digital platforms. FNB announced in the annual report 2015 that there was a significant progress in the migration to electronic channels by its customers. Banking transactions through digital channels has increased to 14% and ATM deposits volume up to 12% while branch deposits decreased of 20%. The use of online banking, banking app and mobile banking increased respectively to 15%, 69% and 25%. Despite the rise of banking fees, credit card transactions augmented to 13%. The overall operating expenses has increased of 11% since FNB continues to invest on digital transformation especially on smart devices, website upgrades and new digital products and services. 6% augmentation of the number of new active accounts is due the introduction of new products and services that meet customer's needs.

Channel volumes

Description	**2015**	**2016**	**2017**	**2018**	**2019**
ATM/ADT		225 045	232 310	243 023	245 433
Internet		201 019	214 701	205 200	197 957
Banking App		59 075	99 410	164 018	237 873

Mobile App		36 469	43 818	43 716	42 050
Point-of-Sales		1 051 480	1 166 844	496 673	578 634
Card swipes				785 405	872 989
eWallet					R26 million transmitted
Nav>>					R6.8 million home originations

Source: FNB Annual Reports (2019)



Source: FNB Annual Reports (2019)

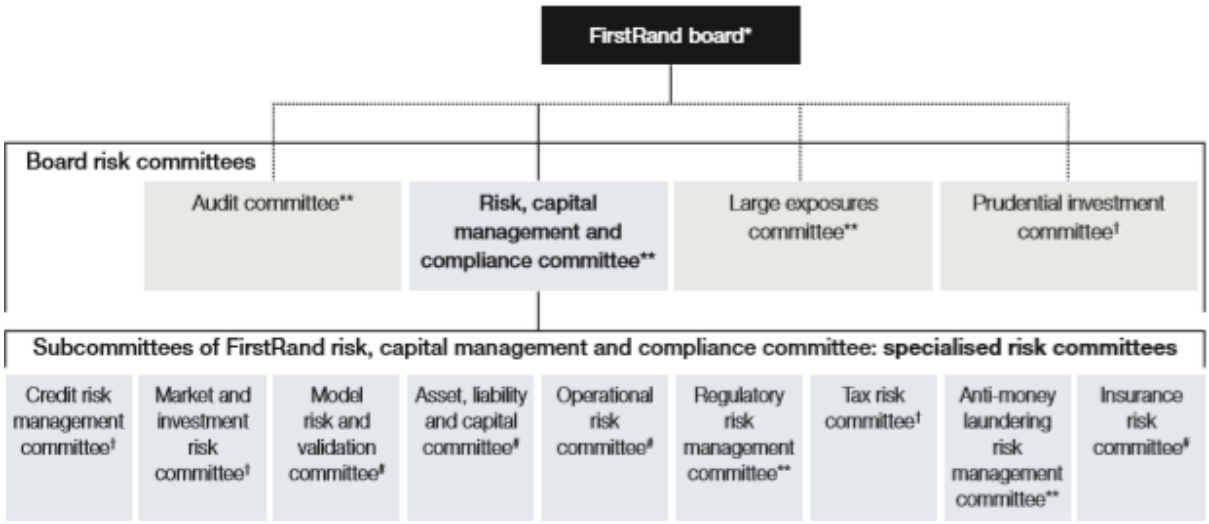
Figure 6.50: Electronic channel volumes

Customers are rewarded with ebucks, slow lounge, fuel, airtime and data for using innovative digital products such as ewallet, cellphone banking, FNB connect and others.

Risk and Capital Management Performance

Risk Governance

FNB manages risks through definition of risk structure from the board and executives committee down to the other stakeholders where roles and responsibilities are well-established.



Source: FNB (2019)

Figure 6.51: FNB Risk Governance

Risk Governance Structure

Global macroeconomic environment and political risks: as a developing country, economic conditions in South Africa are affected by global tendency such as the dollar strength and the normalisation of the US monetary policy. Shortfall of commodities price, political instability and terrorism equally affect performance of banks.

Regulatory and legal risks: Banks must follow regulatory requirements such as foreign account tax compliance, countering terrorist financing, treating customer fairly, protection of personal information (POPI), IFRS9 and the national credit amendment among others. Some legal decisions negatively impact business operations and reputational damage.

Business operations and Internal control systems: Continuous electricity shortages increase business resilience and structural limitations such as skill shortages, national infrastructure, water supply and telecommunications profoundly disturb the business. Data management as well as cybercrime and fraud are the new digital factors disrupting business evolving.

Local macroeconomic environment: South Africa is predominantly affected by the sustainability of the current account deficit and the sovereign rating downgrade that affect foreign investment and increase the cost of funding. It is not safe for South Africa to depend on foreign capital inflows through foreign direct investment (FDI) to improve the economy.

The journey of FNB transformation started with business improvement that contains employment equity,

Socio-Economic Performance

Employment equity / B-BEE Requirements

Considering the gender streaming in South Africa, FNB has increased female representation by hiring 64% of the staff as female. Additionally, 78% of the employees are African, Coloured or Indian (ACI) while 37% represents top management including women and ACI employees. FNB equally supports organisation owned by black people especially woman. Although FNB missed that target in 2015, it remains a priority for years to come. FNB got an appreciation award for partnering with the department of Labour to reduce the rate of employment in South Africa (FNB, 2015). At FNB bank, 72% of black-owned people are suppliers among which black women-owned suppliers have a critical place. Almost every year, FNB bank spends R3.4 million on women development.

Employee Development

In 2015, productivity increased by 13% and customer service by 13% in 2015 because FNB implemented outcomes-based remuneration model. Training and development are critical for a long-term growth. In order to upskill people, FNB invested R21.5 million on learnerships and R 220.2 million on skills development. This amount includes 80.22% done on ACI employees and 70.55% done on women progress besides R833 000 spent to support people with disabilities.

Women Empowerment

FNB catalyst and FNB Ignite and the two programmes put in place by FNB to empower talented woman and give them promotion.

Leadership Development

Looking forward to the 2025 vision which is for FNB to remain a bank leader in South Africa, two pilot programmes were implemented in 2015 to identify and develop world-class leaders. Such transformational leadership goes in hand with the digital disruption.

Sustainable Development

Between 2014 and 2015, FNB invested over R75 million into grassroots programmes to reduce poverty and support marginalised communities. In order to promote education for future generation, FNB offers a primary education and tertiary programme for bursars in addition to community care and hospice programme.

Eco-Friendly and Environmental Performance

Environment Protection

FNB has integrated social and environmental principles into the decision-making processes to protect natural resources and remain sustainable. From green star certified building that FNB has to the reuse and recycling processes, FNB uses sustainable features such as HVAC diffusers that turn off when the space is empty. The receipt-free option applied at the ATMs and ADTs has saved 200 trees to be cut. Since 2015, FNB has promoted ecoEnergy loan as well as the installation of solar power systems to make its customers' premises more energy efficient. Since 2008, FNB is a member of the carbon disclosure project launched in UK and has been on the climate performance leadership index due to the improvement of its carbon footprint reduction. FNB equally adopts the equator principles that cover management of environmental risks in 2009. Internally, FNB follow its own environmental and social risk assessment (ESRA) process through the followings:

- Deal origination – Deal identified and screened against an execution list (FNB, 2019)
- Categorisation – deals categorised by project type, value and ESRA category (FNB, 2019)
- Environmental and social risk review – Environmental and social risk measurement informs in-house opinion (FNB, 2019)
- Credit application – Credit application calculated (FNB, 2019)
- Action plan – Action plan and covenants defined with client in line with legal documentation (FNB, 2019)
- Monitoring and evaluation – Ongoing monitoring and evaluation against agreements and legal documents (FNB, 2019)

6.7.3 Banking Performance at Nedbank

Becoming digital is one thing and meeting the related budget is something else since smart devices, internet fees, others are expensive and not affordable by everyone. In order to deliver growth value, Nedbank strives to manage the difficult environment and the increasing regulatory agenda over years through strategic action response. The macroenvironment is characterised by volatile markets, emerging markets, slow GDP growth and commitment with the government and labour to improve development. Such macroenvironment is not that enabling because of the followings:

- It drives lower credit demand and transactional activity

- It creates a weaker operating environment and risks increase
- It causes the Rand weakness leading to inflationary pressures
- It increases the cost of capital due to long bond yields

Financial Indicators Performance

Financial Ratios

Table 6.12 displays financial ratios and financial aggregates that inform about financial condition of Absa bank from 2010 to 2019.

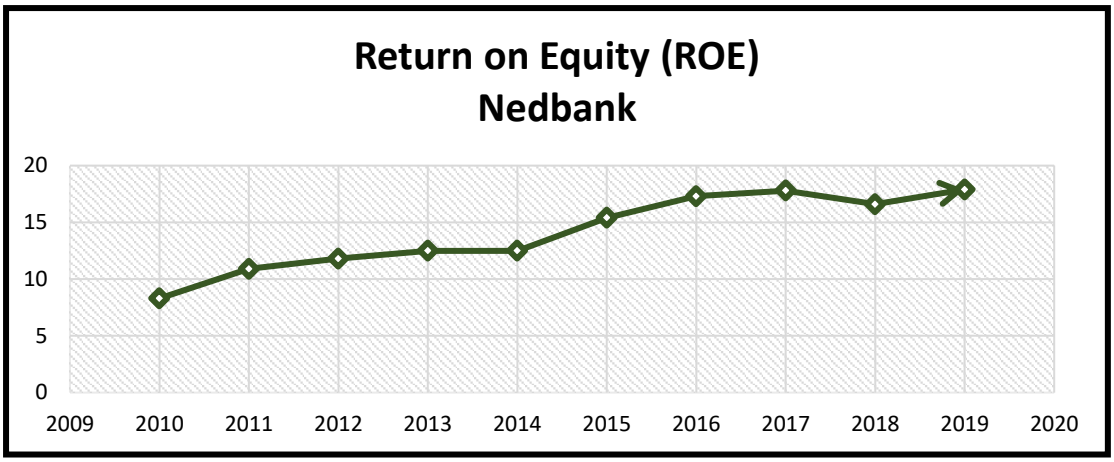
Table 6.12: Nedbank Financial Ratios from 2010 to 2018

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Cost-to-Income ratio (CIR)	56.3	56.8	56.3	56.6	58.1	58.8	57.6	58.1	58.9	
Return on Assets (ROA)	0.7	0.9	1	1.1	1.11	1.1	1.2	1.21	1.19	
Return on Equity (ROE)	8.3	10.9	11.8	12.5	12.5	15.4	17.3	17.8	16.6	17.9
Total Capital ratio	14.9	15.8	15.3	14.5	14.7	14.1	16	16.7	15.7	
Credit loss ratio	1.38	1.17	1.1	1.1	0.82	0.78	0.67	0.47	0.54	

Source: Nedbank Financial Statements

Return on Equity (ROE)

This ratio shows that Absa bank has been experiencing a growing performance since 2010. It equally tells the shareholders about how profitable the money that they invested in the business is. The higher the return on equity, the higher the stock prices. However, the return on equity ratio is efficient when the bank does not rely on leveraging to increase the profit or margins.

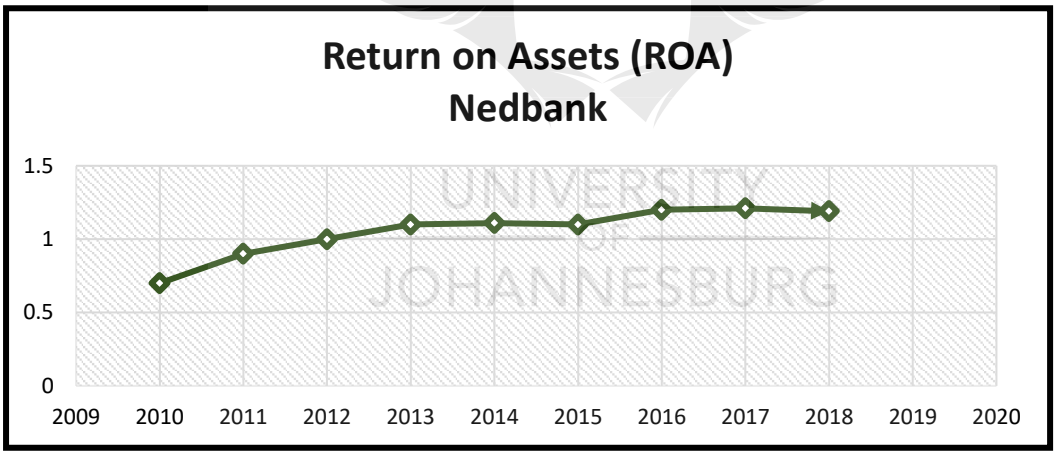


Source: Author's Compilation

Figure 6.52: Financial Ratios – Return on Equity (ROE)

Return on Assets (ROA)

This ratio is another indicator of profitability since the net income is more than the average of assets. This suggests that for a bank to remain profitable, ROA ratio should be more than 1 at least. In this case, ROA is more than 1 at Absa bank since 2010.



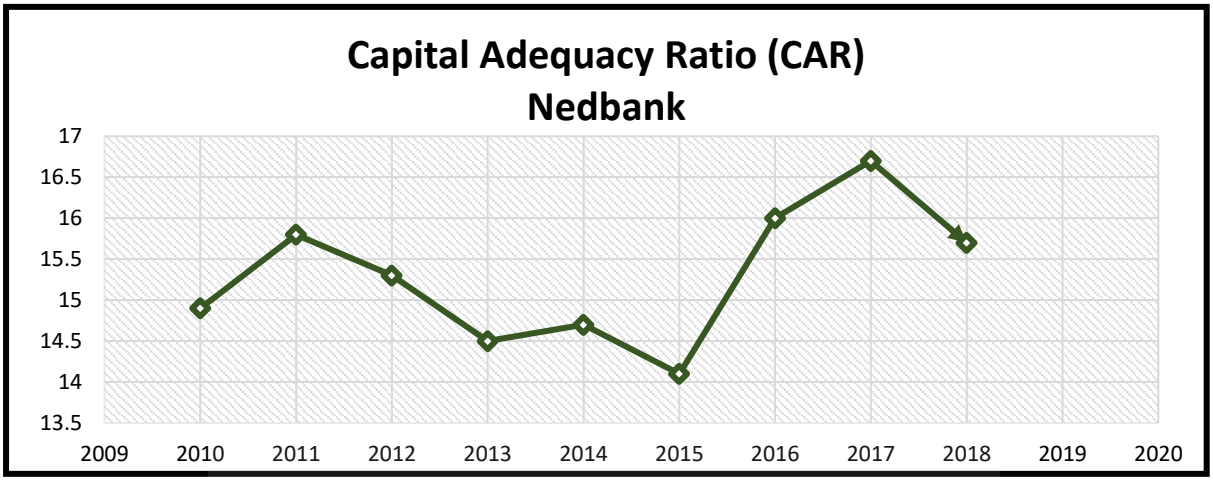
Source: Author's Compilation

Figure 6.53: Financial Ratios – Return on Assets (ROA)

Total Capital Adequacy Ratio (CAR)

Also known as a capital to risk weighted assets ratio, CAR ratio tells about how aligned the bank capital to the corresponding risks is. This means that banks should have a minimum capital that can absorb a reasonable amount of losses. Following the Basel III requirements, the minimum percentage of the total capital adequacy should be 8% for a bank to remain

profitable. In the case of Absa bank, the CAR has been more than 14% since 2010 as displayed in the figure 6.54 below.

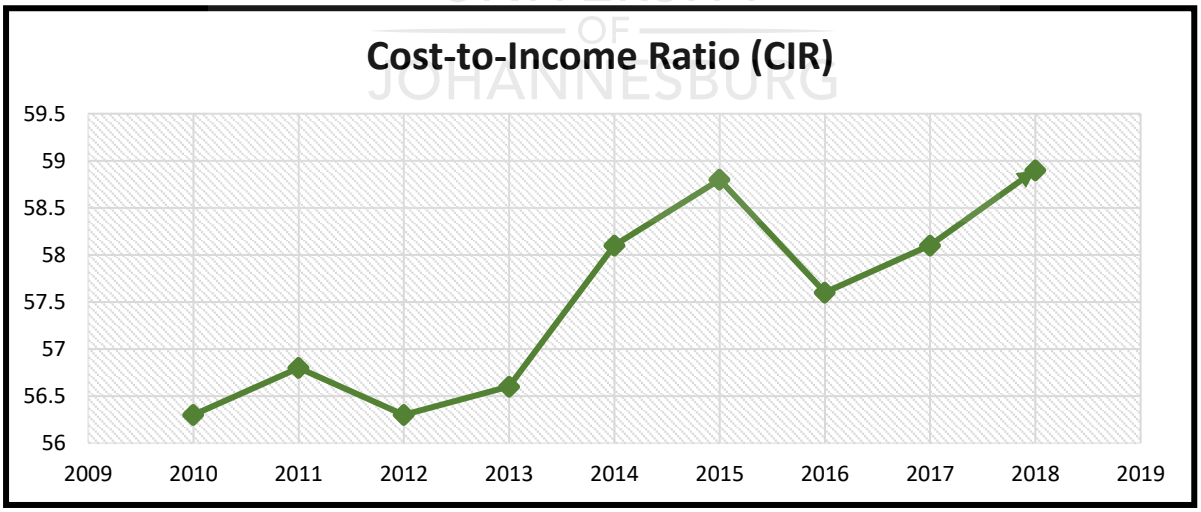


Source: Author's Compilation

Figure 6.54: Financial Ratios – Total Capital Adequacy

Cost-to-Income (CIR)

The cost-to-Income ratio tells about bank efficiency since it represents the percentage of cost or expenses over income or revenues in the banking business. This implies that the less the CAR ratio, the more efficient the bank is. Table 6.55 below shows that at Absa bank, the CAR ratio has been more than 55% per year despite a slight decrease in 2012 and 2016.



Source: Author's Compilation

Figure 6.55: Financial Ratios – Cost-to-Income

Non-Financial Performance Indicators

Digital Performance

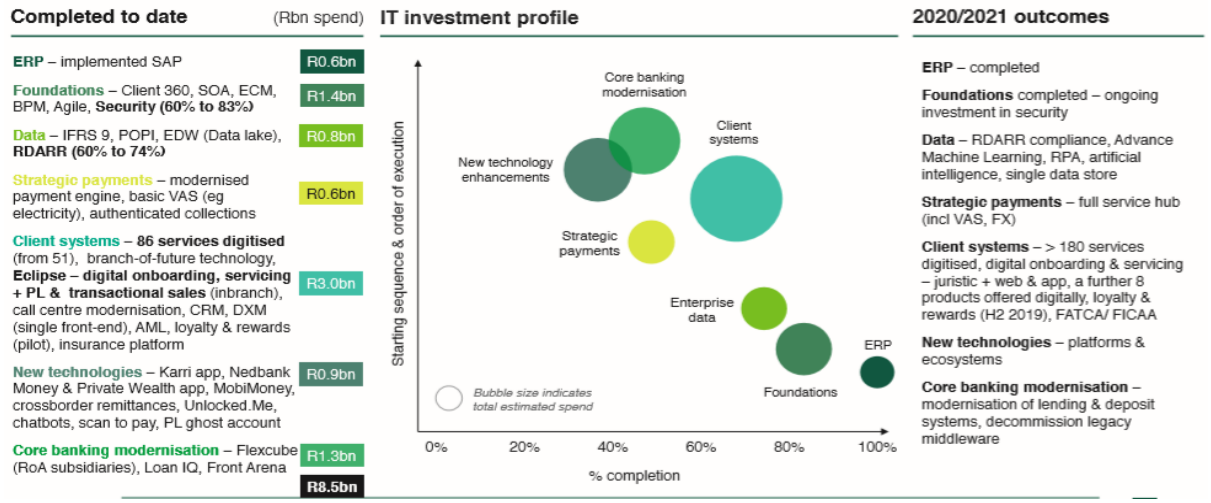
In 2019, regulatory projects are completed and investment in new technologies are decreasing. The orange colour represents the level of compliance, the grey is for illustration only and orange arrow shows the current position.

Source: Nedbank (2020)

Figure 6.56: Nedbank Partnering with Fintech

Strategic Performance

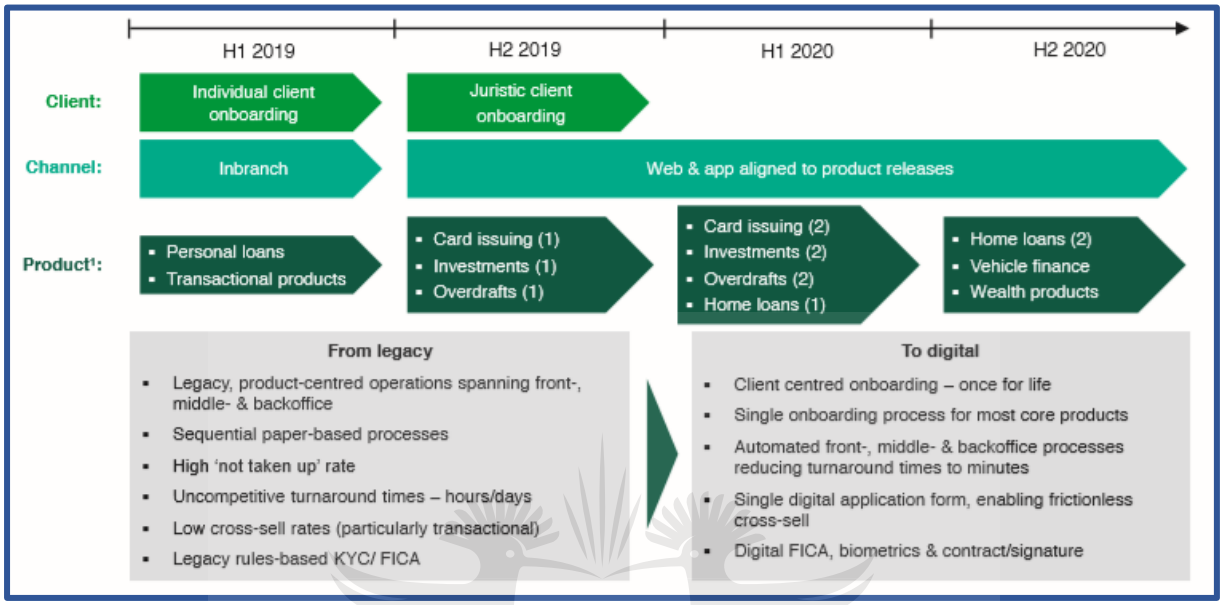
Increase performance at Nedbank starts with the capacity of creating value in a macroeconomic challenge environment. Nedbank Investing on growth in the international franchise and manage cost and revenue. Provide innovative market-leading client experiences, investing on IT systems and digital data capabilities and improving Nedbank client and market penetration. Strategic performance at Nedbank is enabled by managed evolution and completed IT programmes by end 2020. Figure 157 below as part of the objective of becoming leader in the banking industry, Nedbank has defined 2021 objectives that includes ERP implementation, defined full payment service using VAS and FX; digitised client systems as well as the core banking modernisation.



Source: Nedbank Annual Report 2019

Figure 6.57: Nedbank Digital Programmes by end 2020/2021

Nedbank additionally planned to implement digital FICA, biometrics and contract/signature and the low cross-sell rates as well as sequential paper-based processes as displayed on figure 6.58 below.



Source: Nedbank Annual Report 2019

Figure 6.58: Nedbank End-to-end Digital client

Customer satisfaction

Nedbank is the first large South African introducing a zero-monthly-fee account. Nedbank invest in client-centred innovation to continuously meet customer satisfaction and thus increase productivity. In 2015, Nedbank opened 84 new branches called branch of the future and 110 new ATMs.

Regulations: Bank performance relies on how the bank follows the regulations applied to their industry. Nedbank has a transparent relationship with the regulators to establish a regulatory change programme the ensures compliance with the Basel III and other regulations principles. Nedbank has invested more than R105 billion on government and public sector bonds to support the funding needs of governments.

Risk Quality Performance: Equity risk: Equity investments in the banking book are exposed to risk appetite. Foreign currency risk: Bank capital or foreign denominated equity can lose value due to the instability of exchange rate. Trading market risk: Nedbank uses scenario analysis and stress tests to manage exposure to the trading market risk. Operational risk:

operational risk theme includes cybersecurity, intense regulatory environment, information technologic risk, financial crime and outsourcing risk.

Socio-Economic Performance

Quality Education: Nedbank invested R54 million in socioeconomic development with more than 50% allocated to education across many projects such as basic and tertiary education initiatives, learnerships and graduate programmes in addition to the bursary support the staff and their families.

Employee Development: Nedbank continuously invest in the staff transformation and development through leadership and culture change.

B-BBEE Requirements: Nedbank has been maintaining level 2 B-BBEE for the 7th consecutive year as measured by the amended financial sector code (FSC). 75% of the purchasing volume are done locally in South Africa.

Eco-Friendly and Environmental Performance

Sustainable Development: Nedbank focuses on sustainable banking practices with current and future benefits. Nedbank contributes to the society through participation in the YES initiative that consist of creating more than 3 300 new job opportunities in 2019. Nedbank were part of the loan facility for Ethiopian railways to link passengers and freight between the Northern, the central and the eastern regions of Ethiopia. Nedbank introduced zero-monthly-fee accounts such as Pay as you use, unlocked me and mobiMoney to reduce inequalities in the South African population. Nedbank donated R1 million to the South Africa red cross society to assist with the Durban flood release efforts. Nedbank equally raised money to alleviate the challenges and suffering of millions of people from Mozambique, Zimbabwe and Malawi wo where victims of the devastating cyclone "Idai" in March.

Environmental Conservation: Nedbank is the first South African bank to launch a green bond on the JSE. Nedbank 2030 initiatives is to support green affordable housing, student accommodation and embedded energy. Nedbank equally launched the Nedbank insurance green property plan to offer investment opportunities. Nedbank also invested on water balance programme to send the water back to the ecosystem in addition to the renewable energy programme. Nedbank is committed to participate on ESG and climate change matters.

Digital Banking Performance at Standard Bank

Standard bank of South Africa limited is the largest bank in the group and its produces its own annual report and audited financial statements following appropriate frameworks, requirements and regulations. The current results are extracted from the standard bank annual report published online at www.standardbank.com/reporting.

Financial Metrics

Financial Performance

Table 6.13 displays financial ratios and financial aggregates that inform about financial condition of Absa bank from 2010 to 2019.

Table 6.13: Standard Bank Financial Statements from 2010 to 2018

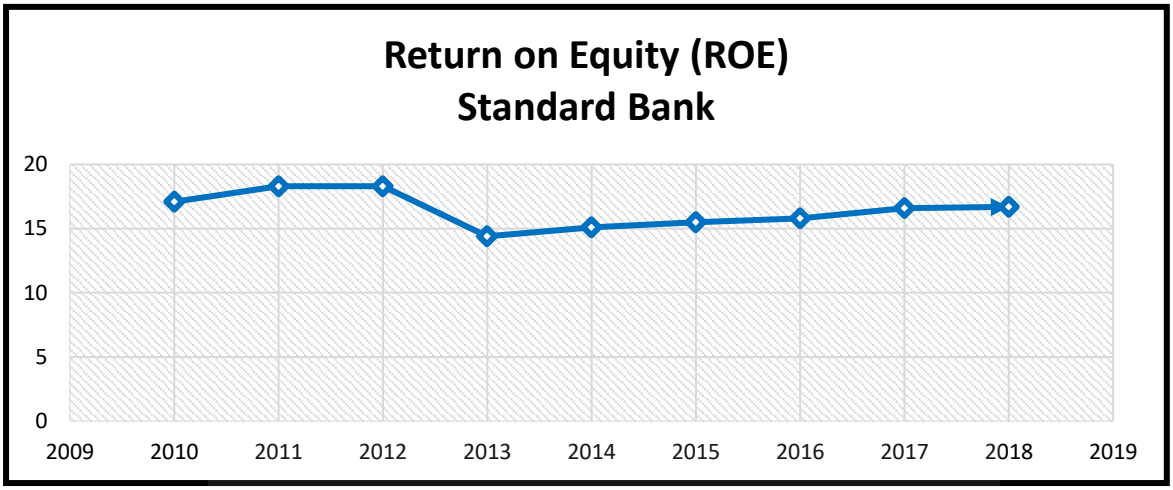
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Return on Equity (ROE)	17.1	18.3	18.3	14.4	15.1	15.5	15.8	16.6	16.7	
Return on Assets (ROA)	2.1	2.4	2.3	2.0	2.3	2.2	2.5	2.6	2.3	
Cost-to-income ratio	55.3	54.8	54.5	56	57	57.6	59	58.3	60.3	
Credit loss ratio	1.18	0.8	0.89	1.11	1.04	0.84	0.75	0.77	0.59	
Tier 1 capital adequacy ratio	11.5	10.7	10.6	12.8	12.3	12.1	13.7	14.2	13.3	
Capital Adequacy Ratio (CAR)	14.9	13.5	13.8	16.5	15.8	15.3	16.8	16.6	15.7	
Headline earnings	7 697	9 489	11 140	10 279	11 738	12 721	14 061	15 211	14 872	
Total Assets				1 016	1 131			1 360	1 360	

Source: Standard Bank Financial Statements

Return on Equity (ROE)

This ratio shows that Absa bank has been experiencing a growing performance since 2010. It equally tells the shareholders about how profitable the money that they invested in the business

is. The higher the return on equity, the higher the stock prices. However, the return on equity ratio is efficient when the bank does not rely on leveraging to increase the profit or margins.

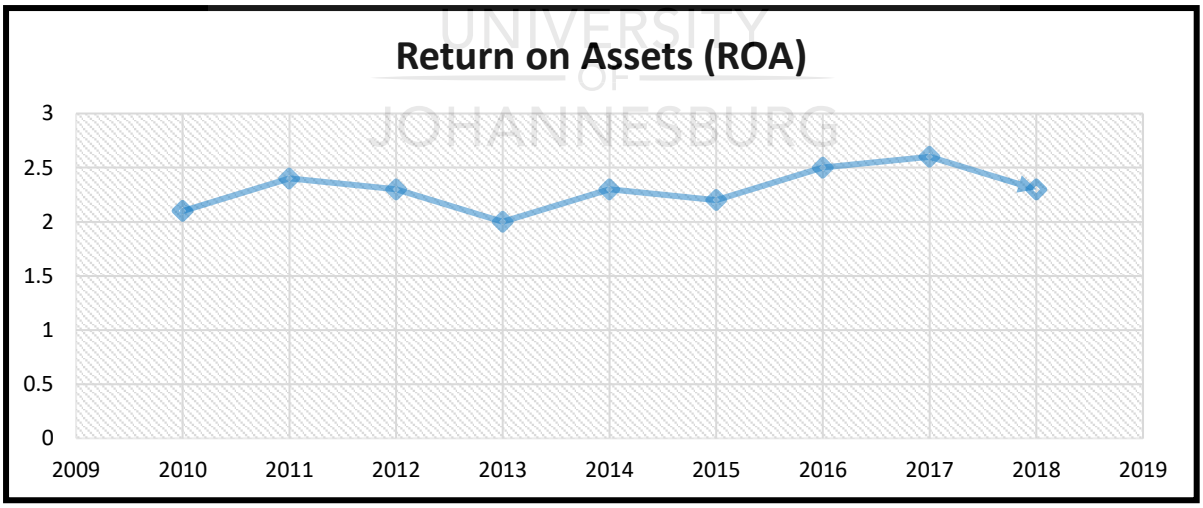


Source: Author's Compilation

Figure 6.59: Financial Ratios – Return on Equity (ROE)

Return on Assets (ROA)

This ratio is another indicator of profitability since the net income is more than the average of assets. This suggests that for a bank to remain profitable, ROA ratio should be more than 1 at least. In this case, ROA is more than 1 at Absa bank since 2010.

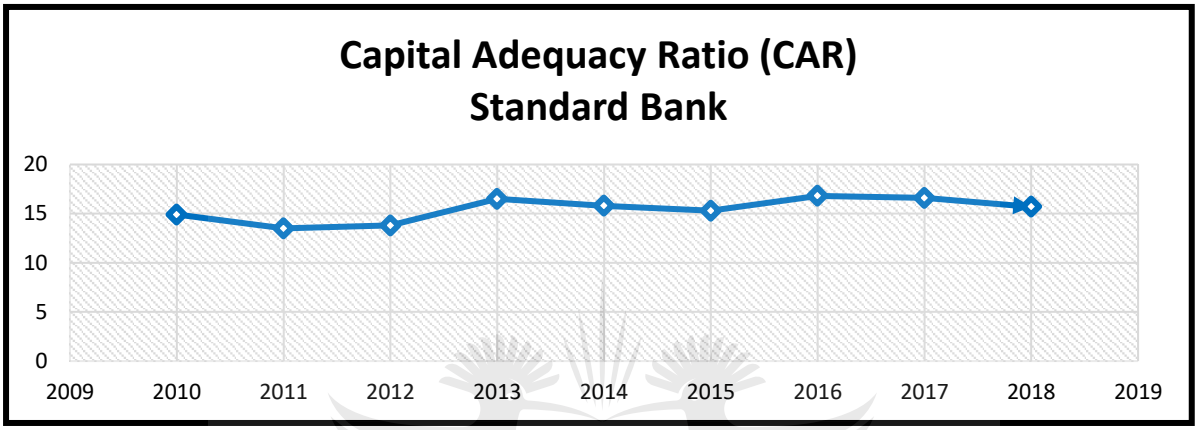


Source: Author's Compilation

Figure 6.60: Financial Ratios – Return on Assets (ROA)

Total Capital Adequacy Ratio (CAR)

Also known as a capital to risk weighted assets ratio, CAR ratio tells about how aligned the bank capital to the corresponding risks is. This means that banks should have a minimum capital that can absorb a reasonable amount of losses. Following the Basel III requirements, the minimum percentage of the total capital adequacy should be 8% for a bank to remain profitable. In the case of Absa bank, the CAR has been more than 14% since 2010 as displayed in the table 6.61 below.

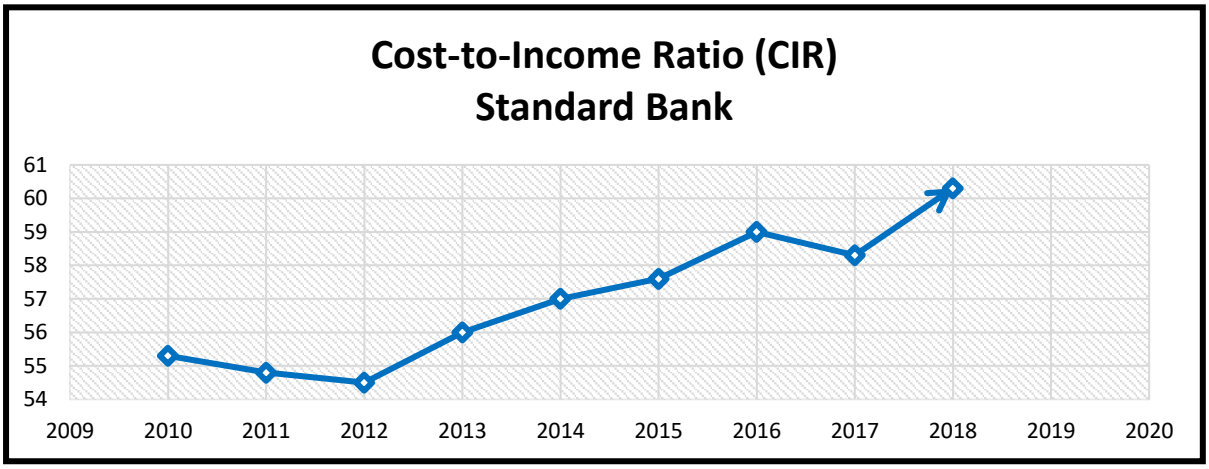


Source: Author's Compilation

Figure 6.61: Financial Ratios – Total Capital Adequacy

Cost-to-Income (CIR)

The cost-to-Income ratio tells about bank profitability since it represents the percentage of cost over income in the banking business. This implies that the less the CAR ratio, the more efficient the bank is. Figure 6.62 below shows that at Absa bank, the CAR ratio has been more than 55% per year despite a decrease to 54% in 2013 and 2016.



Source: Author's Compilation

Figure 6.62: Financial Ratios – Cost-to-Income

Non-Financial Metrics

Digital Innovation Performance

Digital performance stars with the vision of standard bank which is to digitally enable financial services organisation in addition with modernising core banking platforms. ATMs offer all financial services that can be required at the bank or online banking.

Partnering with Fintech

Since Fintech are rising competition with financial institutions, standard bank chose to join forces with them to identify innovative digital start-ups and products with a higher potential to help the bank in delivering better values.

Information Technology Report

IT report published by standard bank reveals that IT security capabilities are increased to better protect the customer. Replacement of ageing legacy systems with flexible, scalable and agile IT architecture.

Strategic performance

Standard bank follows an approach of value creation for people, shareholders as well as other stakeholders namely clients, regulators, suppliers, governments, communities and investment analysis.

Governance Structure

The governance framework enhances effective decision-making process. Standard bank equally follows a governance for shared value, performance linked to value creation and the remuneration that drives value over time. Stakeholders' relationship, Pan-African workforce: Intellectual Property, Infrastructures, Natural resources, Capital Providers and Leadership constitute the governance structure.

Strategic performance Standard bank is illustrated through the followings:

Compliance

The Basel III capital requirements stipulates the followings:

- Increased quality, quantity and consistency of the capital
- Increased risk coverage
- Capital conservation buffer

- Pillar 2a and domestic systemically important bank buffer
- Countercyclical buffer
- Leverage ratio to have a minimum of 4%

Standard bank complies to the following requirements:

- Basel III and other regulations
- Company and bank Acts
- International financial reporting standards (IFRS)
- Johannesburg stock exchange listings
- King report on corporate governance known as King IV code
- IR framework of the international integrated reporting council
- Sustainalytics
- Carbon disclosure project
- United Nations Sustainable Development goals
- Equator principles
- Global reporting initiatives

Client satisfaction

Standard bank strives for customer satisfaction through continuous offering of diverse digital products and services that fulfil customers' needs. Customer experience remains the centricity of all business decisions. Standard bank measures strategic performance based on how satisfied the customer through indicators is such as net promoter score (NPS) and the client satisfaction index (CSI). The higher score in South Africa channel shows that client' money is safe, there are well-assisted and financial services are convenient.

Risk performance

Addressing people's financial needs is related to doing the business with ethical values, regulation and the socio-economic environment rules promote good risk management. Standard bank established a risk-aware culture while managing a conscious risk-taking approach to ensure long-term survival. Considering the dynamic business world, banks need to define the risk tolerance above the risk appetite in order to meet the goal of risk capacity acceptable by the business.

Socio-Economic Performance

Employee engagement

Standard bank promotes employee engagement through definition of better work conditions. Employee performances are measured through two indicators such as employee net promoter score (ENPS), employee turnover and employee equity. In 2017, the EPNS scored +14 meaning that most of the employees are business promoters. The overall employee turnover rate was 8.8% including 5.5% for voluntary employee turnover and 2.3% for voluntary regrettable turnover. Employment equity is well-represented with more than 30% of black people in the top management.

B-BBEE Requirements

Standard bank moved to level 1 status in 2017 compared to level 2 that it has in 2016. 32% of women are represented at the executive and 38% at the senior management level.

Stakeholders' Development

Developing a good strategy is for the business to effectively manage employee, client and the rest of stakeholders.

Communities: Standard bank applies the SEE impact areas to define and maintain shared values in South Africa as well as in the rest of Africa. The bank launched the award-winning Fenix crowd-funding platform to fund the South African tertiary education and thus stop crisis.

Education and Skills development

Standard bank improves access to student finance including Fenix as well as supporting early childhood development. They equally ensure educational outcomes and access to work opportunities and skills development.

Eco-Friendly and Environmental Performance

Sustainable development

Standard bank enables inclusive and equitable quality of education and therefore define learning opportunities for all. Standard bank improves relationship with strategic partners to facilitate trade and investment flows into Africa in addition to enabling infrastructure to support inter-Africa trade. Standard bank financed six green energy projects South Africa in 2018 especially the funding of water infrastructure to limit severe drought. Standard bank also invests in fighting against rhino poaching by allocating preferential banking fees and interest rate on the funds.

Environmental Help

Standard bank restructures debt for sectors affected by climate change while keeping integrity of the loan book. Standard bank focuses on 10 socio-economic and environmental impact areas such as:

- Inclusive economic growth
- Innovation, entrepreneurship and enterprise development
- Education, learning and development
- Financial inclusion
- Combating financial crime

Standard bank deploys climate change solutions for mitigation and adaption both in the agricultural and renewable energy sectors to enhance African economic development. Enhancing job creation and enterprise development in every country of operation highlights eco-friendly approach develop by the bank. Financial inclusion has helped people to be home ownership and thus benefit from shelter and dignity. In 2018, 2 054 home loans were allocated to families to keep their houses. Some digital products such as instant money and instant money wallet was launched to create access and affordability for anyone. In 2014, Standard bank invested R2.1 million on solar power and photovoltaic projects with renewable energy capacity of 175 megawatts during the third phase of the REIPP programme. They belong to the "CPD" climate performance leadership index A-list since they scored 80% in the carbon disclosure project (CDP) the same year. Standard was mandated to lead the REIPP programme through to 2025. In 2014, Standard bank produced 5% of CO2 lower than the previous year due to data integration and a refined carbon footprint calculation including assurance process.

Key indicators – SBSA			
		2014	2013
Carbon equivalent	metric tons	319 784	335 475[1]
Equator Principles			
Number of projects financed		1	5
Number of advisory services on project finance deals			2
Total energy consumption of premises	kilowatt hours	307 149 817	321 639 144
Diesel to operate generators	kilowatt hours	5 608 551	3 682 739[2]
Electricity purchased: buildings	kilowatt hours	220 352 899	248 428 258[3]
Electricity purchased: ATMs	kilowatt hours	5 447 900	5 245 725
Electricity purchased: data centres	kilowatt hours	49 261 142	49 658 033
Natural gas purchased	kilowatt hours	26 218 167	14 380 800
Renewable energy generated	kilowatt hours	261 158	243 589
Water consumption[4]	kilolitres	980 117	319 085[5]
Paper consumed and recycled			
Paper consumed	tons	2 502	2 842
Paper recycled	tons	1 496	1 574
Waste generated	tons	2 108	2 071
Reused waste (non-hazardous and hazardous)	tons	92	61
Recycled waste (non-hazardous and hazardous)	tons	1 203	1 247
Waste to landfill (non-hazardous)	tons	812	762
Waste to landfill (hazardous)	tons	1	1

1 Restated to align to GHG Protocol.
2 Diesel restated to include diesel from data centres and due to conversion factor correction.
3 Restated due to double metering of Standard Bank Centre.
4 Water consumption is estimated across all premises using data from 25 meters.
5 Data collected from 11 regional and head office buildings.

Source: Own compilation

Figure 6.63: Environmental report

Energy Consumption

For heating, ventilation and air-conditioning systems to the lighting, information technology is also a huge source of energy consumption. The reduction of energy use will positively affect the rise of electricity costs, carbon tax burden as well as energy supply apprehensions. South Africa is a member of the REIPP programme that aim at securing 17 800 megawatts of renewable energy by 2030. The industrial and commercial bank of China funded R 20 million as part of the support agreement to meet the 2030 target regarding clean energy and energy efficiency. All South African banks should reduce environmental footprint through efficient management of energy, water, carbon emissions and waste. A South African energy management system is built according to the ISO 500001 standards to manage energy strategies and achievable targets. Waste is the result of water consumption, waste generated paper consumption and recycling.

6.8 Digital Challenges

Current business challenges can be associated to natural change and upgrade or to the digital transformation. Macroenvironment includes emerging markets, government compliance, and

economic conditions that influence banking performance. The impact of national disaster equally affects performance of banks.in the country with further effects in the international market. At the country level, dependence to the internet providers, the use of robots, digital skill requirements, financial crisis and the free market still constitutes sources of business decline.

6.8.1 Competition and technological change

Change of business environment especially with new entrants and technological innovation impact productivity because of related operational risks. This suggests that business performance depends on how the institutions can manage related risks and turn them into opportunities profitable for the business.

Fintech disruption: It pushes banks to optimise customer satisfaction while offering relevant products and services at low cost in addition to the improvement of innovative business processes and diversification of market segmentation.

Sophistication of cybercrime and frauds: It pushes businesses to deliver scalable digital product and services that meet customer needs and expectations.

Security breaches and data mismanagement: It helps businesses to allows to develop artificial intelligence solutions with global data for crime prevention.

Organisational change management: It helps businesses to maintain continuous investment on technology platforms as well as employee education and awareness to prevent risks.

Regulatory oversight: It helps businesses to remain compliant to the regulations while ensuring customer satisfaction as well as the economic development.

Banking business transactions as well as digital products and services innovated by banks follow rules and regulations defined by the government and the SARB. In doing so, related risks should be mitigated and turn into opportunities in order to well monitor regulatory amendments in people, processes and systems.

6.8.2 South Africa Macro Environment Challenges

Business performance in South Africa is trapped in a difficult and dynamic macro environment slowing down the process of business optimisation. although businesses and customers continuously defined effective strategies to respond to the unstable environment, the followings remain increasing issues:

Emerging markets: Emerging markets are under pressure due to incessant customer' needs and are limiting the competitive edge of the existing business in the market.

Dynamic markets: from the rest of Africa to South Africa, technological change and emerging products easily boost the overall economy. Hence the

Government Compliance: Nowadays, businesses must work with the government and the department of labour to improve growth in SA. Moreover, the regulation agenda constantly change and jeopardise business survival.

Economic growth: Economic growth is very slow in South Africa due to the sustainability of the current account since more than a decade affecting the balance of payment of the country. Additionally, the Gross Domestic Product (GDP) have been decreasing as well.

Economic Recession

Since the beginning of year 2019, South Africa was affected by a recession in its economy.

National Disaster

As predicted in the conceptual framework elaborated in this research, banks define measures for financial risk management compared to methods to handle national disaster. Unfortunately, South Africa is going through a tragic national disaster since March 2020 caused by a virus named Corona Virus or CIVID-19. So far, the pandemic of the Corona virus has killed more than 50 thousand of people around the world with an epicentre in Europe. All countries in the Earth planet are now developing sophisticated solutions to stop the contagion of the Corona virus.

6.8.2 South Africa Microenvironment Challenges

Fintech technology

Observations showed that Fintech financial services also developed sophisticated platform for business and payment processes. Thumzup is one of the innovation company in South Africa that provides a solid platform for business and payment to Fintech, retail markets and other financial services. Fintech uses mobile point of sale to increase merchandise space together with the use CRM system to easy e-receipting. Furthermore, they use mobility device to improve the process of stock take, GRV, ePOD and stock replenishments.

Dependence to Internet Providers

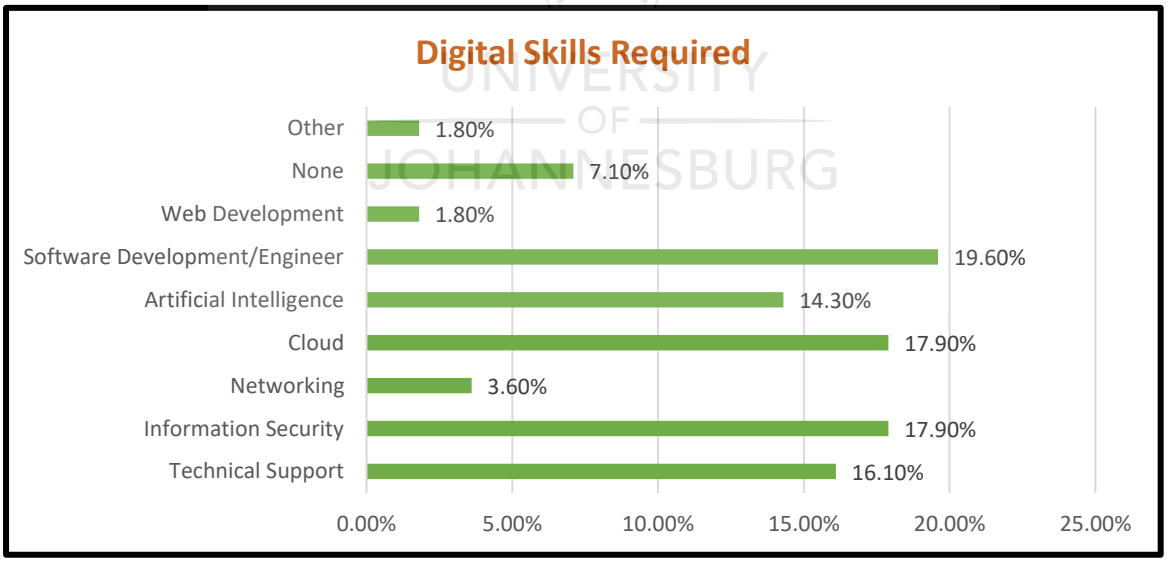
Since digitalisation involves internet of things to be operational, South African banks as well others business and individuals rely of internet providers to benefit from the digitalisation.

Dependence to intelligent algorithm providers

The efficiency of digitalisation goes in hand with the use of machine learning and intelligent machines that require complex algorithms to thinks and behave as human being. Financial market includes both business leaders and followers while other business choose to be at the core of the digitalisation through conception of algorithms and systems. This once again shows the dependence to machine learning and artificial intelligence system providers.

Digital requirement skills

It is up to the governments to introduce new technology in the academic and scholar's curriculum and ensure that it is followed. Evidence also shows that government should lead in educating people on how to handle the disruption coming with the 4IR. In South Africa, the higher level of unemployment correlate with the lower level of IT skills in addition to the lack of innovation. The official publication of public sector ICT forum published that the following skills are required in South Africa:



Source: Public Sector ICT Forum (2018)

Figure 6.64: Digital Skills Required

In addition to core digital skills required, the following have been listed by the ICT Forum as lacking skills for an improvement in the overall ICT society in South Africa.

Free market

There are IT companies in the opened market that deliver innovative solutions to the whole set of customers. For instance, the use of mobile point of sale, e-receipting and stocktake devices can change and affect the traditional process with the banks. This constitutes a challenge for banks in a sense that systems at the bank might not be compatible with the systems used by the customer.

Financial risks

The roadmap to digital transformation goes in hand with the increase of financial risks.in the South Africa context, the South African reserve bank ensure financial stability through risk management and controls. Global observations show that there will be new areas of concern around risk management considering the level of change occurring in the market.

Compliance to drones

Drones technologies are not allowed to fly over people in residential areas without their permission and are forbidden to fly close to 50 metres of national key points. Drone operators and pilots should be trained by people from the SA civil aviation authority and be fully licensed as prescribed by the regulations. Payment technologies should be compliant with payment regulations defined by payment providers. Governments should be ahead of new technologies in order to define regulations and policies accordingly.

6.8 Corona Virus Pandemic and Bank Performance in South Africa

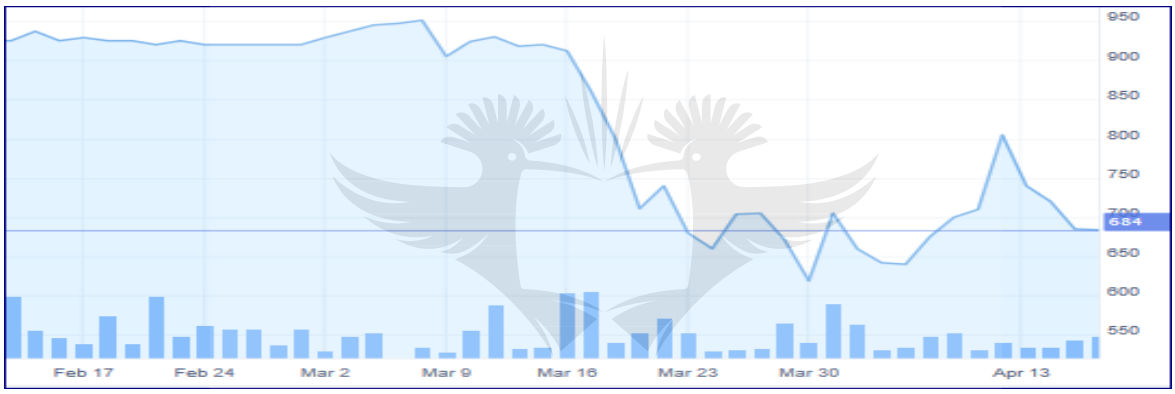
Although the pandemic of COVID-19 started in China and get spread in Europe, South Africa also got contaminated in the beginning of March 2020. Regarding the rapid spread of the virus in the country, President Cyril Ramaphosa declared a state of national disaster around the middle of March 2020. Since then, the national disaster framework as defined in the constitution is finally going through strict implementation to protect human resources.

Following the national disaster management policies, President Cyril Ramaposa declared the lockdown stage of 21 working days requesting people to stay home. He also ordered essential services to remain operational while using strict health measures. Two weeks later the President declared extension of the lock down to an additional two weeks due to the increasing number of infections going on in provinces in the country. Yes, the President first cared about human resource protection, but it happens that the economy of the country as well as banking performance are taking a catastrophic shock. Figure 169 below displays decrease of Absa market shares since the beginning of the pandemic as published by the Sashares (2020).

Source: ZA Investing (2020)

Figure 6.65: Absa bank market shares' value

Figure 6.66 below displays decrease of Nedbank market shares since the beginning of the pandemic as published by the Sashares (2020).



Source: ZA Investing (2020)

Figure 6.66: Nedbank market shares' value

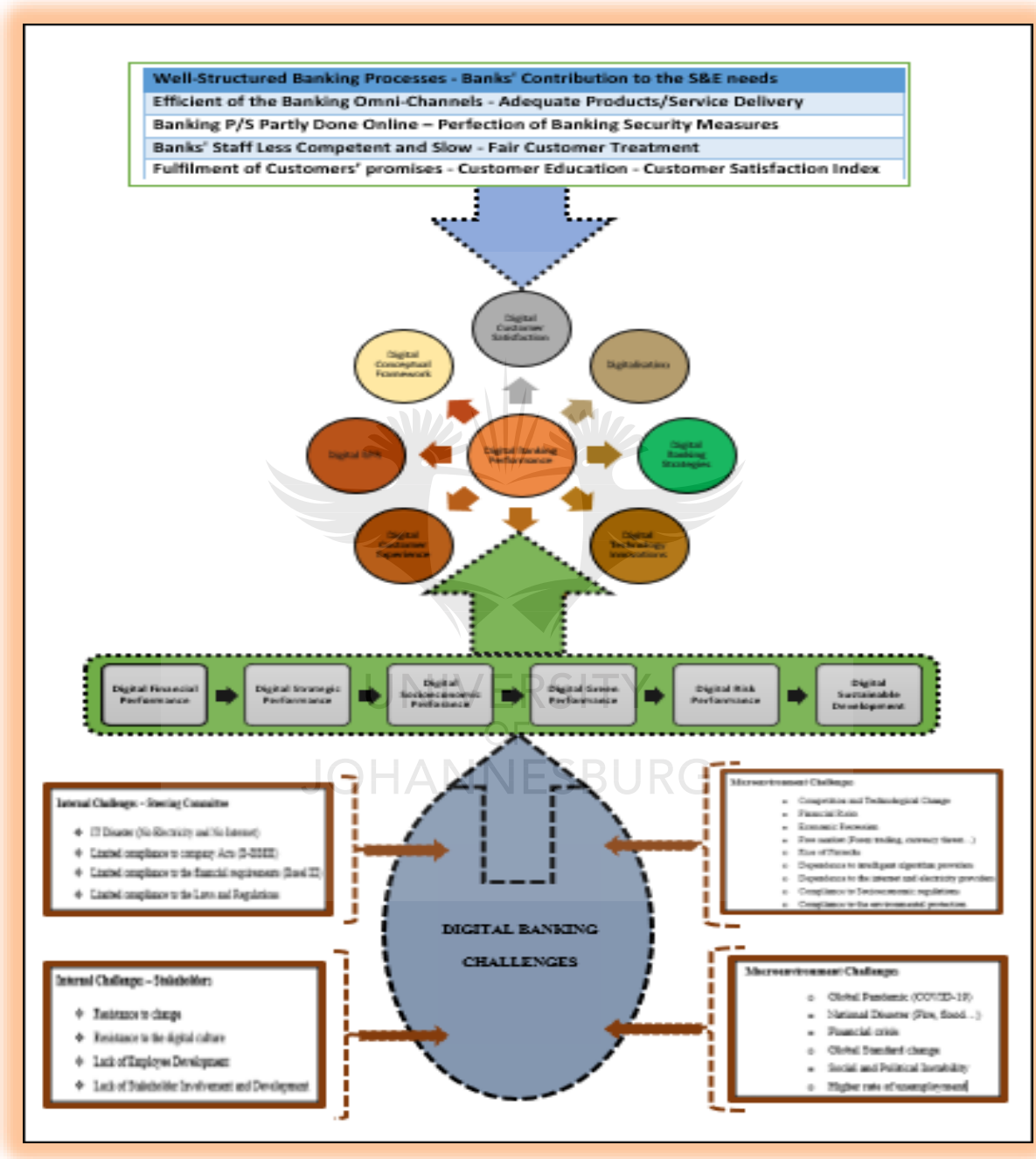
Figure 6.67 below displays decrease of Standard bank market shares since the beginning of the pandemic as published by the Sashares (2020).

Source: ZA Investing (2020)

Figure 6.67: Standard bank market shares' value

6.9 Banking Performance Conceptual Framework

Findings from the review of literature, data collection and ultimately from the annual reports published by all South African banks helped to build a digital banking performance conceptual framework as displayed on the figure 6.68 below.



Source: Author's Compilation

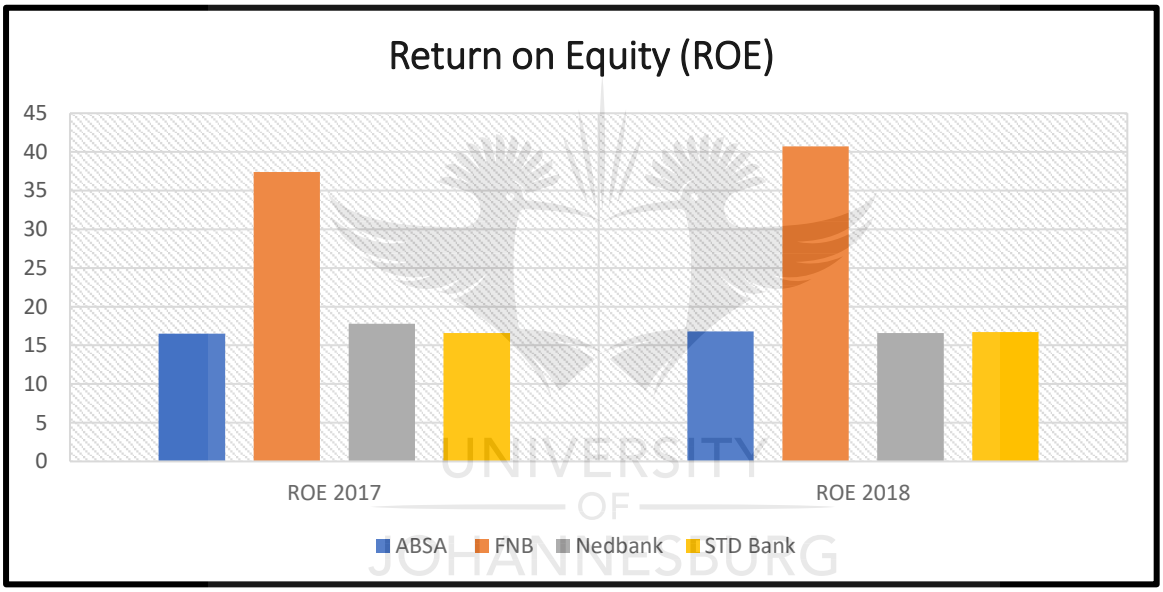
Figure 6.68: The Integrated Banking Performance Conceptual Framework

6.10 Digital Comparative Analysis Between South African Banks

This study elaborates on existing and potential elements that can affect performance of South African banks. This section emphasises on the comparison between South African in order to classify the level of digitalisation and customer satisfaction. Difference analysis is done for both financial and non-financial measurements and between 2017 and 2018. Financial performance is compared using the return on equity (ROE), Return on Assets (ROA), headline earnings, volume of assets, cost-to-income and credit loss ratios as well as capital adequacy ratio.

6.10.1 Return on Equity (ROE)

Return on equity (ROE) of the South African banks from 2017 to 2018 is depicted as follow.



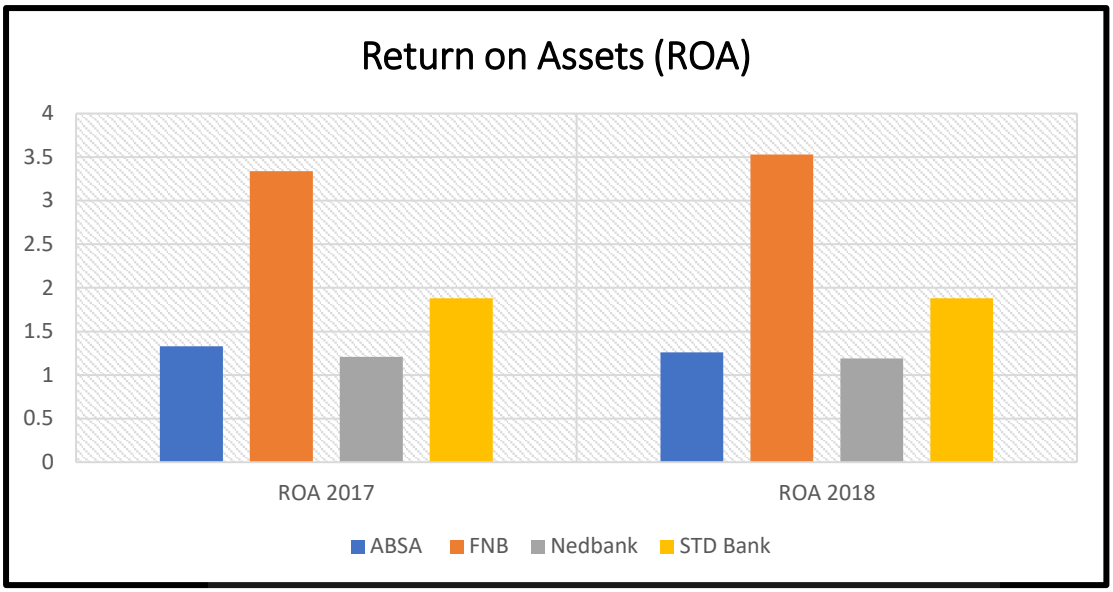
Source: SARB (2020)

Figure 6.69: Most Performing Bank – Return on Equity

Figure 6.69 shows that from 2017 to 2018, FNB bank leads the financial sector with a higher return on equity of more than 40% compared to Absa bank, Nedbank and Standard banks that almost have the same rate of return from 2017 to 2018.

6.10.2 Return on Assets (ROA)

Return on assets (ROA) of the South African banks from 2017 to 2018 is depicted as follow.



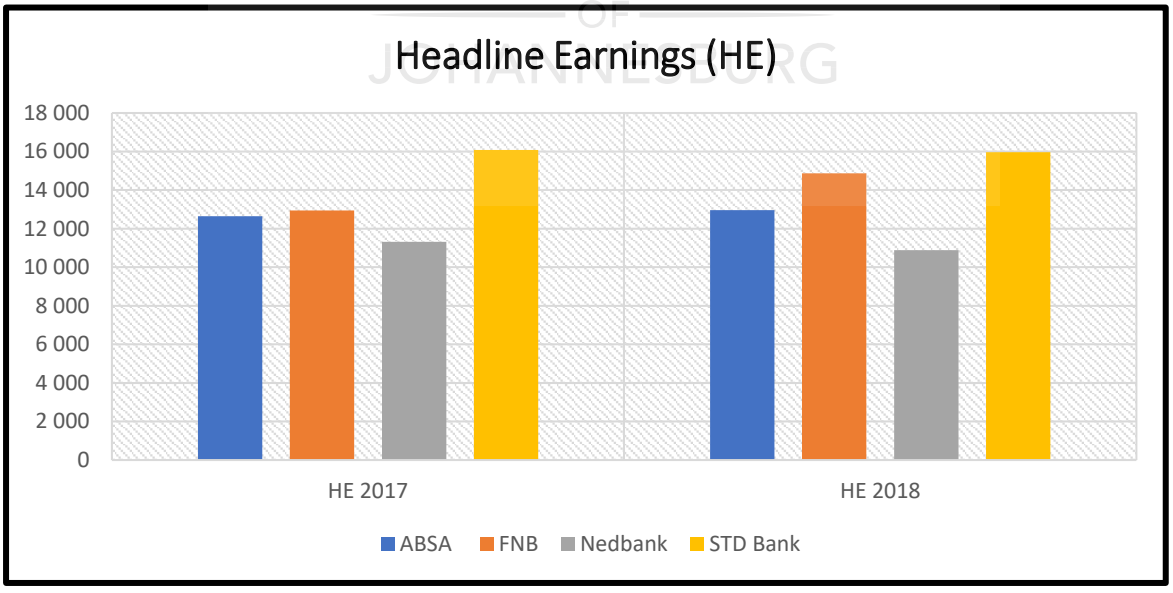
Source: SARB (2020)

Figure 6.70: Most Performing Bank – Return on Assets (ROA)

Figure 6.70 shows that from 2017 to 2018, FNB bank leads the financial sector with a higher return on assets compared to other banks. Standard bank occupies the second place before Absa bank. Lastly comes Nedbank with the lowest return from 2017 to 2018.

6.10.3 Headline Earnings

Headline earnings of the South African banks from 2017 to 2018 is depicted as follow.

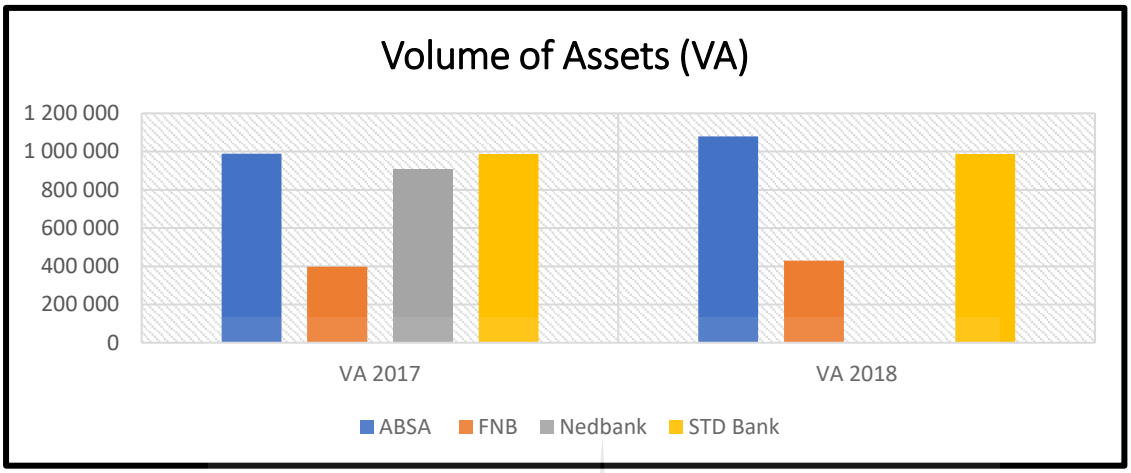


Source: SARB (2020)

Figure 6.71: Most Performing Bank – Headline Earnings

Figure 6.71 shows that from 2017 to 2018, Standard bank leads the financial sector with a higher amount headline earning compared to other banks. Both Absa and FNB bank got an increase on the earnings compared to Nedbank where the earnings decreased.

6.10.4 Volume of Assets



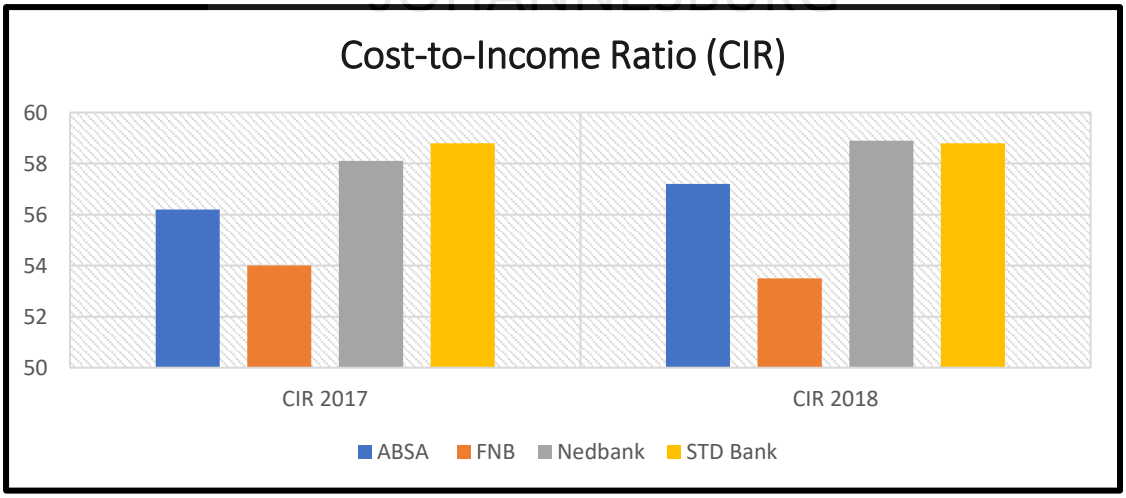
Source: SARB (2020)

Figure 6.72: Most Performing Bank – Volume of Assets

Figure 6.72 shows that from 2017 to 2018, Absa bank leads the financial sector with a higher volume of assets compared to other banks.

6.10.5 Cot-to-Income (CIR)

Cot-to-Income (CIR) of the South African banks from 2017 to 2018 is depicted as follow.



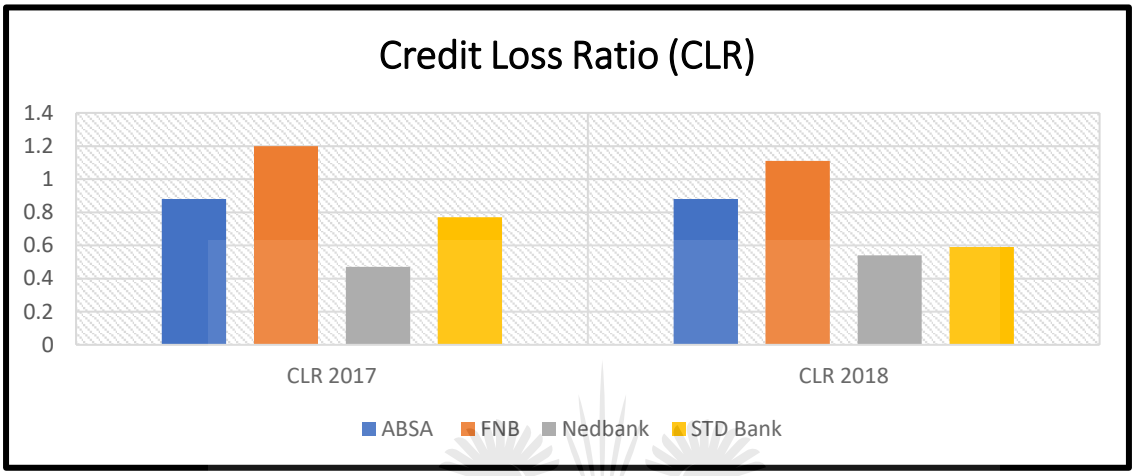
Source: SARB (2020)

Figure 6.73: Most Performing Bank – Cost-to-Income (CIR)

Figure 6.73 shows that standard bank got the higher CIR in 2017 compared to the other banks. Nedbank is the second in the list then followed by Absa and lastly the FNB bank. In 2018, Nedbank became the leader before Standard bank, Absa and FNB banks.

6.10.6 Credit Loss Ratio (CLR)

Credit Loss Ratio (CLR) of the South African banks from 2017 to 2018 is depicted as follow.



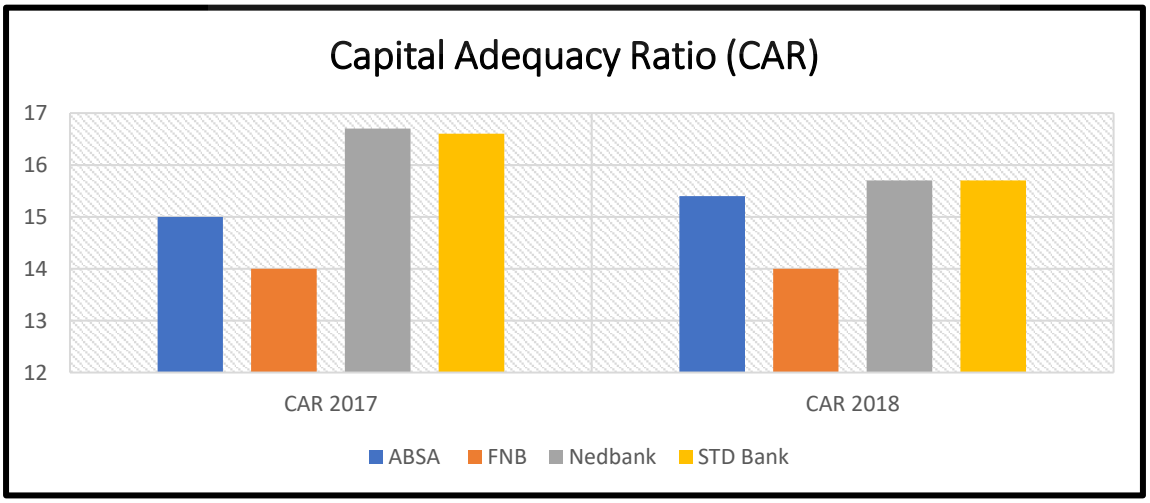
Source: SARB (2020)

Figure 6.74: Most Performing Bank – Credit Loss Ratio (CLR)

Figure 6.74 shows that from 2017 to 2018, Nedbank leads the financial sector with the lowest CLR compared to other banks. Then follow the Standard, Absa and FNB banks.

6.10.7 Capital Adequacy

Capital Adequacy of the South African banks from 2017 to 2018 is depicted as follow.



Source: SARB (2020)

Figure 6.75: Most Performing Bank – Capital Adequacy Ratio (CAR)

Figure 6.75 shows that from 2017 to 2018, Nedbank leads the financial sector with a higher rate of capital adequacy compared to other banks. Then follow the Standard, Absa and FNB banks.

6.11 Conclusion

This chapter about discussion and findings based on secondary sources by means of using banks' websites as well as the SARB' website has resumed avenues of the performance of banks.

As financial entities, South African banks build digital strategies, technologic innovations and customer experience to meet requirements enforced by the digitalisation. Research findings specified that the overall banking performance includes financial, strategic, digital, socioeconomic, risk and capital and environmental performance. Digital financial performance was assessed using financial ratios such as Return on Equity (ROE), Return on Assets (ROA), cost-to-income, credit loss and the total adequacy ratios. Findings revealed that South African banks have a good financial health. Each year SA banks published their well-structured governance that enables well-organised and successful strategic performance.

Continuous customer satisfaction tells about the good strategic approach Given the volume of digital channels namely online and cellphone banking, Bank App among others, the number of customers using the Bank App among others. Socioeconomic performance revealed that South African banks contribute for the social inclusion, women empowerment, B-BBEE requirements and community education. SA banks also spend millions for youth education ensure employee development through continuous training and upskilling. Following the Basel III requirements, SA banks have been maintaining a minimum capital of 12% to avoid financial and capital risks as prescribed by the SARB. Findings revealed that SA banks have a good environmental performance because they are compliant the sustainable development goals set by the United Nations, energy consumption, carbon footprint and the green buildings. Although SA banks make efforts to be ahead of the technology while following the digital trajectory, they are affected by local and global challenges such as the rise of Fintech technology, the oversight regulations and compliances, dependence to the internet providers and the intelligent machines compromising the supremacy of the humankind.

The study added a section about digital comparison analysis between SA banks from 2017 to 2018. Research findings established that from 2017 to 2018, FNB was leader in the financial sector with a highest return on equity (ROE) and a highest return on assets (ROA) compared to other banks. Standard bank rose to become a leader while comparing headline earnings. Comparison between volumes of assets revealed that Standard bank is the leader with the highest volume of assets. Following the cost-to-income ratio, results showed that Standard bank and Nedbank both led the market compared to FNB and Absa that were the followers. Using credit loss ratio, results showed that Standard bank led the market then comes Nedbank, FNB and lastly Absa. According to the capital adequacy ratio, FNB is the leader because its CAD is slightly higher than the minimum of 12% compared to Nedbank and standard bank that have a very high ratio. It is not advisable for banks to hold too much capital sitting in the books because money can be invested to increase credit interests. In March 2020, the President of the republic of South Africa, Cyril Ramaphosa declared the national disaster and lockdown caused by the Corona virus. Consequently, SA bank' shares lost value in the financial market leading to the decrease of economic growth.

CHAPTER SEVEN

DIGITAL BANKING PERFORMANCE MODELS

7.1 Introduction

Besides research variables as measured in the previous chapter, findings based on the secondary sources revealed that there are additional components that ultimately affect digital performance of banks in South Africa. Since South Africa banks are compliant to publishing their annual reports in their websites, the study finds this disclosed information reliable for analysis.

7.2 Digital Banking Performance components from the secondary sources

Data collected from the South African' banks revealed that the following constituents are already applied at the bank to achieve successful digital transformation.

7.2.1 Digitalisation

Combination of the digital banking strategies, digital technology innovation and the digital customer Experience form part of the overall digitalisation.

7.2.1.1 Digital banking strategies

Digital banking strategies that are appropriate and relevant to manage digital transformation includes the followings:

- Differentiation
- Market Segmentation and Positioning
- Customer and Product-Centric
- Change-Driven Leadership
- Security-Driven Strategy
- Data-Driven Strategy

7.2.1.2 Digital Technology Innovation

The following technological innovations are keys to maintain a competitive stage in the digital revolution.

- Internet of Things

- Smart Innovations
- Smart Devices
- Data Analytics
- Artificial Intelligence
- Digital Banking Channels
- Banking Security Measures
- Cyber Security Measures
- Cloud Domain Architecture
- Green Innovations

7.2.1.3 Digital Customer Experience

The digitalisation process is equally met when digital customers' needs and expectations are covered. Since digital customers are too demanding, SA banks must be continuously ahead of the customer thoughts through constant interactions (conferences, surveys and working groups) (Accenture, 2018). The followings aspects must be taken into consideration:

- Banking and Communication Channels
- Manage Demanding Customers
- Customer Education and Upgrade
- Digital Transformation Support

7.2.2 Digital Business Process Reengineering

Digital Business Process Reengineering is the core of the banking restructuration using digital platforms. It encompasses the following elements:

- Banking Omni-Channels
- Process Change Management
- Payment Terminals/Businesses

7.2.3 Digital Conceptual Framework

In accordance with rules and policies requirements, institutions must have an existing framework that guides business procedures. The study collected the following elements that allows to build up a conceptual banking performance framework.

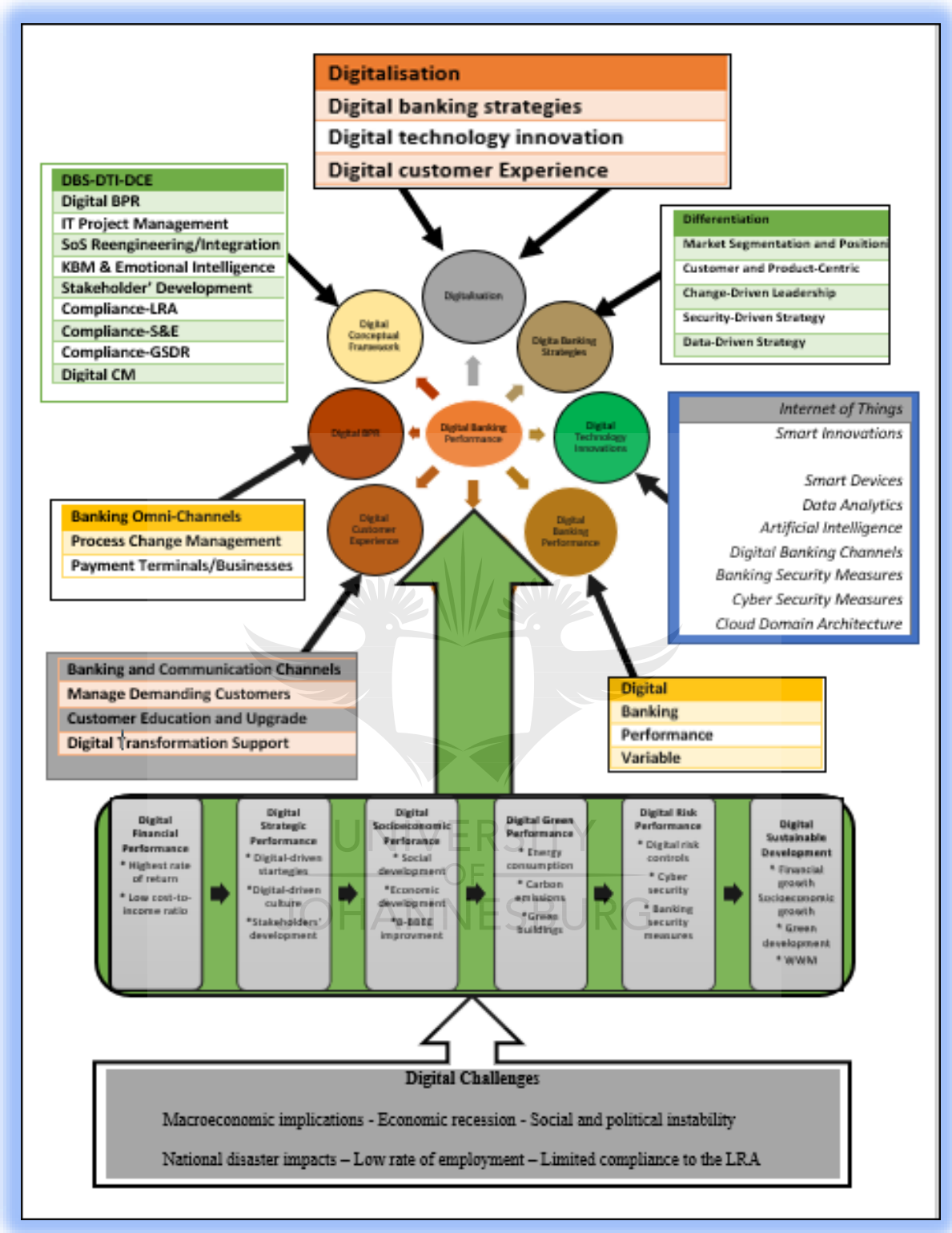
- DBS-DTI-DCE
- Digital BPR

- IT Project Management
- System of Systems Reengineering and systems' Integration
- Knowledge-based Management and Emotional Intelligence
- Employee & Stakeholders' Development
- Compliance-Laws-Regulations-Acts (LRA)
- Compliance-Socioeconomic and Environmental Requirements (SER)
- Compliance-Global and Sustainable Development Requirements (GDDR)
- Digital Challenge Management

As a variable, digital banking performance types can be divided into the following:

- Digital financial performance
- Digital strategic performance
- Digital socioeconomic performance
- Digital green performance
- Digital risk performance
- Digital sustainable development performance

Figure 7.1 below represents the updated banking performance model. It contains components from the previous chapter and the additional components as follow.



Source: Own Compilation

Figure 7.1: Digital Banking Performance – Summary from the Annual Reports

7.3 Digital Banking Performance components from the Primary and secondary sources

Based on the on the discussion and findings, the study revealed there are direct and indirect constituents that have negative influences on the successful implementation of the digital banking performance in South Africa. However, evidence shows that challenging factors that are supposed to only be negative can somehow have positive impacts on banks at a certain extend.

7.3.1 Factors with direct influences

Inside the bank, the steering committee and the stakeholders have the responsibility of improving and preserving productivity and efficiency.

Internal Challenges – Steering Committee

- IT Disaster (No Electricity and No Internet)
- Limited compliance to company Acts (B-BBEE)
- Limited compliance to the financial requirements (Basel III)
- Limited compliance to the Laws and Regulations

Internal Challenges – Stakeholders

- Resistance to change
- Resistance to the digital culture
- Lack of Employee Development
- Lack of Stakeholder Involvement and Development

7.3.2 Factors with indirect influences

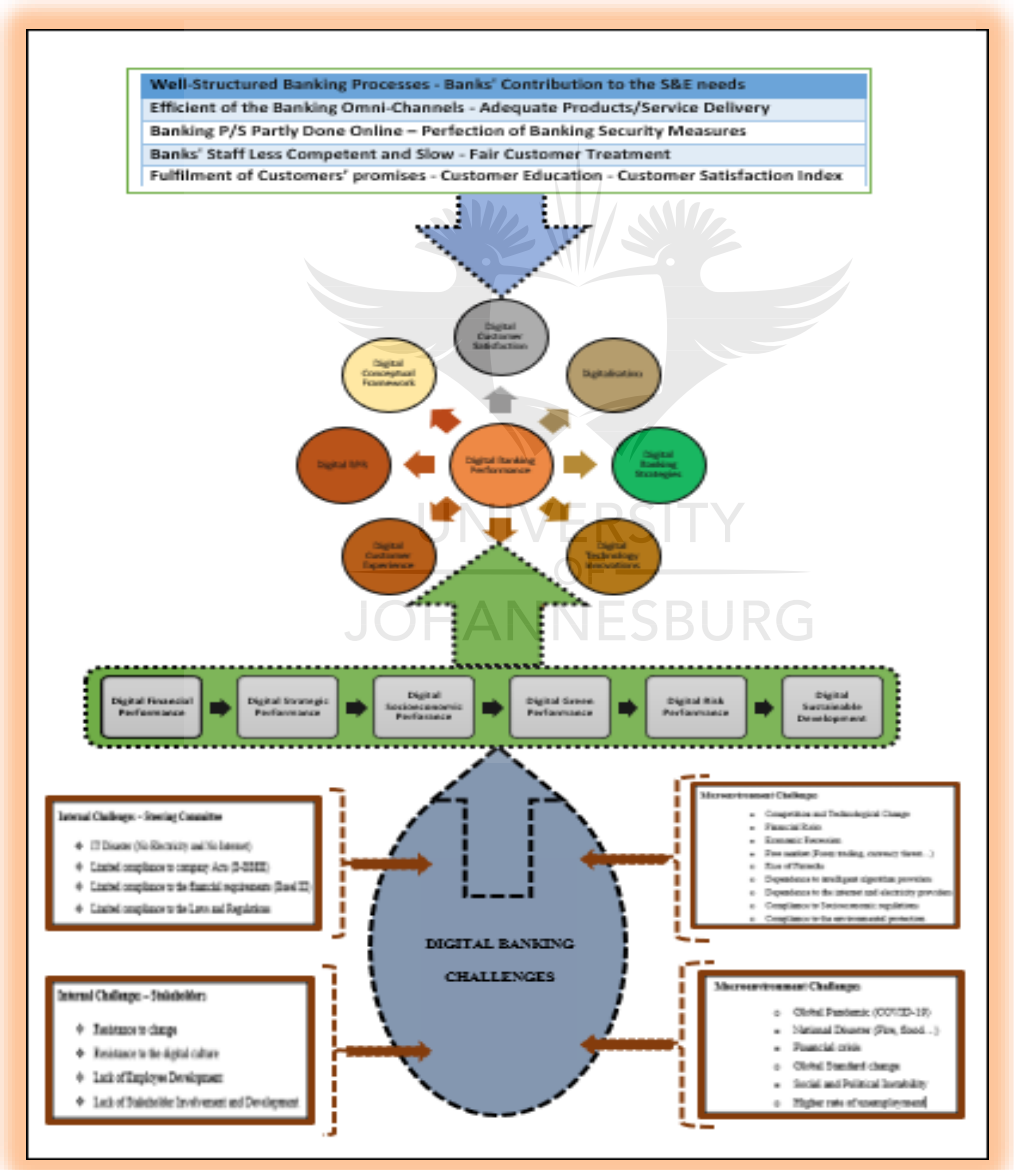
Microenvironment Challenges

- Competition and Technological Change
- Financial Risks
- Economic Recession
- Free market (Forex trading, currency threat…)
- Rise of Fintechs
- Dependence to intelligent algorithm providers
- Dependence to the internet and electricity providers
- Compliance to Socioeconomic regulations

- Compliance to the environmental protection

Macroenvironment Challenges

- Global Pandemic (COVID-19)
- National Disaster (Fire, flood…)
- Financial crisis
- Global Standard change
- Social and Political Instability
- Higher rate of unemployment



Source: Own Compilation

Figure 7.2: Digital Banking Performance – Summary from the Research Findings and the Annual Reports

Figure 7.2 above represents a summary view of the digital banking performance constituents from both the research findings and the bank annual reports as published by each South African bank following authorisation form the SARB.

7.4 Digital Banking Performance Conjunctive Framework

Based on the standard and the rationalised digital banking framework as elaborated in the research and findings section, this study consequently designed a conjunctive digital banking performance framework. This framework that includes all variables and attributes for the digital banking performance framework concept to be applied. The current study believes that an effective and efficient accomplishment of the digital banking performance relies on a strong connection and combination of all relevant elements.

Additional factors such as the digital system innovations, digital BPR management as well as digital banking disaster and its model equally contribute to the increase of the digital banking performance.

7.4.1 Digital System Innovations

The conceptual banking performance components as established by the author emphasise on the Digital System Innovations that promote the digital technology innovations (Deloitte, 2018). It is all about developing the following elements:

- Digital project management
- Digital system of systems reengineering
- Digital system integrations
- Digital knowledge-based management

7.4.2 Digital BPR Management

From the « As-Is » to the « To-Be » banking processes, bank managers should always know the gap to be covered for suitable implementation. Traditional banking processes are the building blocks of the existing processes. Existing processes should always be documented for traceability purposes. In order to be ahead of the customers' expectations and counter their demanding behaviour, bank must design and document potential banking process changes (McKinsey Global Institute, 2017). This suggests that banks should continuously scrutinise the

local and the global financial market to be ahead of latent moves and plan accordingly. The following Digital BPR elements should be followed at the bank while managing Digital BPR.

- Traditional banking processes
- Reengineered banking processes
- Future banking processes

7.4.3 Digital Banking Disaster

Although global and/or national disaster can affect the performance of digital banks, it happens that disaster also comes from the inside. This implies that digital banking should be carefully managed to avoid financial decline. The study listed the following elements as the dangerous factors that cause disaster on bank operations.

- Limited internet access
- Limited communication access
- Big data breaches
- Independence to robots
- Overpowered Artificial Intelligence
- Social Media influences
- Sabotage of could computing

7.4.4. Digital Disaster Management Model

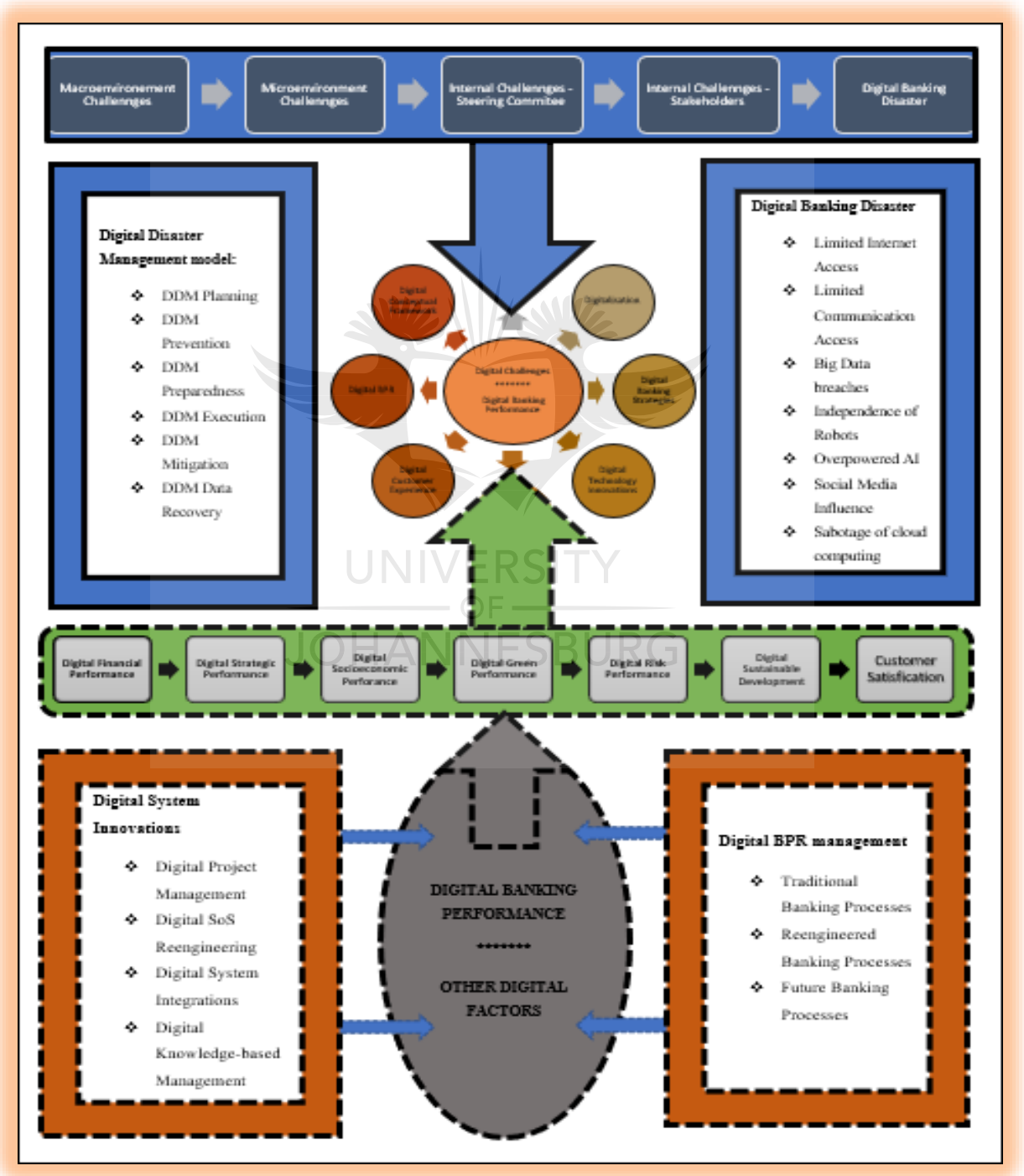
It important for South African banks to have a Digital Disaster Management (DDM) Model that guide the execution when a digital disaster occurs. The following digital disaster phases should be followed:

- DDM planning
- DDM prevention
- DDM preparedness
- DDM execution
- DDM mitigation
- DDM recovery

In summary, figure 7.3 below represents the conjunctive digital banking performance framework that contains all constituents as follow:

- Digital banking performance variables

- Digital banking performance type
- Digital banking challenges
- Digital system innovations
- Digital BPR management
- Digital banking disaster
- Digital disaster management model

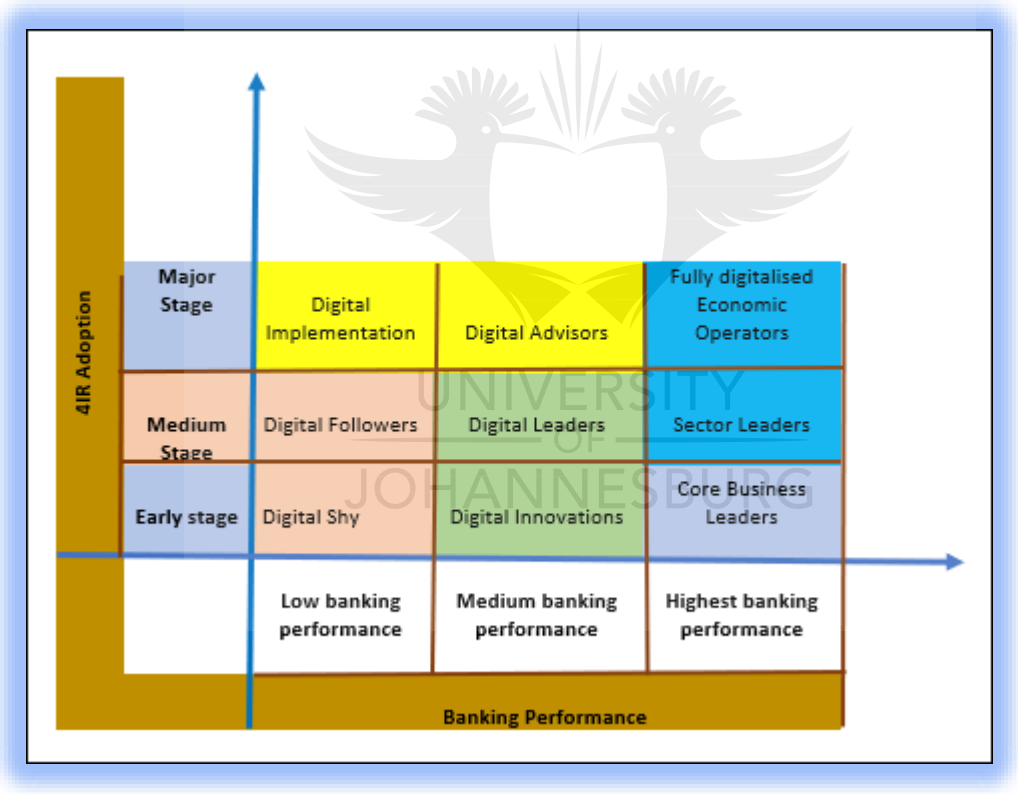


Source: Own Compilation

Figure 7.3: Digital Banking Performance Conjunctive Framework

7.5 Digital Banking Performance Stages

Since the arrival of the fourth industrial revolution known as 4IR, organisations, corporates and institutions are gradually embracing digital change in South Africa. This entails that companies are at different stage on their trajectory towards the digitalisation process. Furthermore, the study realised that respondents were answering the questionnaire according to the digital stage in which their company is. Based on the research findings that found out that digital banking performance evolves together with the level of adoption of the 4IR, the current study designed a digital banking performance stages as depicted on figure 7.4 below.



Source: Own Compilation

Figure 7.4: Digital Banking Performance Stages

Combination of both the banking performance and the 4IR adoption gives the following stages.

7.5.1 Low banking performance

7.5.1.1 Digital shy

At this stage, organisations are not well informed about the emerging digital change. They are comfortable with their low level of banking performance without concerns.

7.5.1.2 Digital followers

Once organisations and institutions are aware of the digital disruption that is unavoidable, they choose to watch and learn from the existing leaders in the market.

7.5.1.3 Digital implementation

At this stage, companies are convinced about the need to implement digital requirements. Laws and regulations already include the digital transformation aspects. This means that rules and polices in the company must be aligned to the new exigencies.

7.5.2 Medium banking performance

7.5.2.1 Digital innovations

For a bank that has a medium banking performance, the need of prospering exists. Technological innovations are initiated for market positing purposes.

7.5.2.2 Digital leaders

Once the bank masters the core technological innovations, it becomes a leader in the banking industry. The bank has digitalised specific products and service lines.

7.5.2.3 Digital advisors

At this stage, the bank plays the financial advisor for other financial institutions in the banking industry in both local and global market.

7.5.3 Highest banking performance

7.5.3.1 Core banking leaders

For a bank that is already profitable, the need consists of developing long-term sustainability through enhancement of the core banking transactions.

7.5.3.2 Sector leaders

At this stage, the bank has become a digital leader not only on specific products and services but it covers a whole range of financial services.

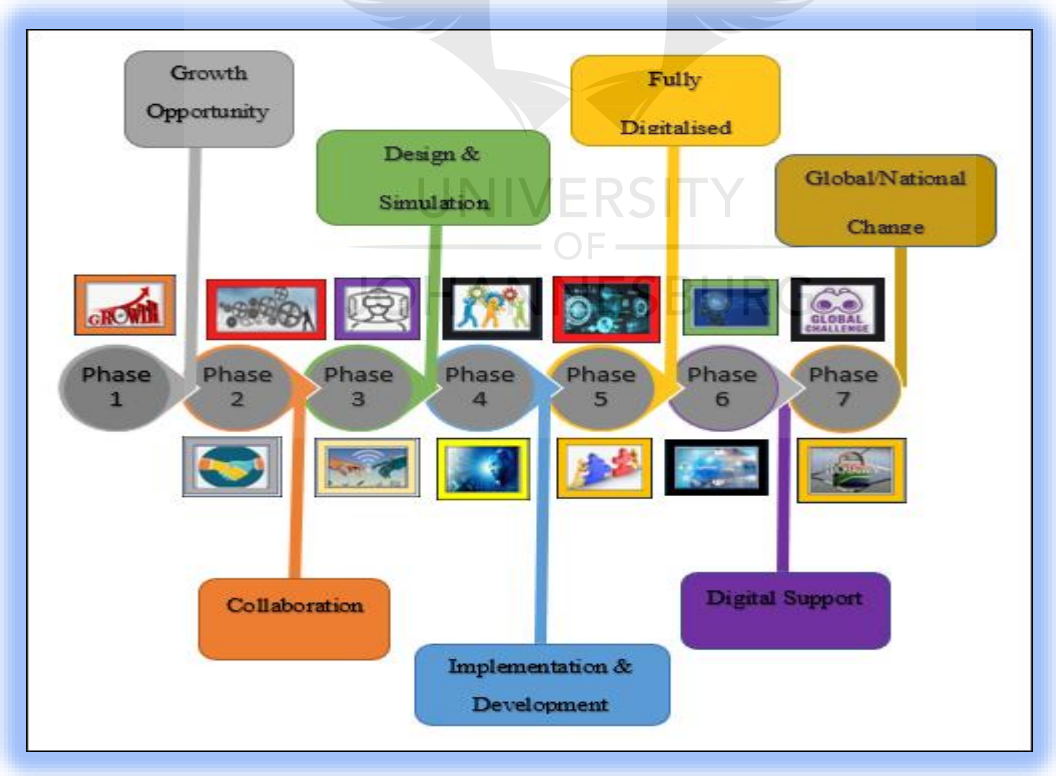
7.5.3.4 Fully digitalised economic operators

At this stage, all banking processes are fully digitalised including internal and external processes towards stakeholders. Customers can complete all banking services online using smart devices and technologies.

7.6 Digital Financial Service Delivery Model

Since organisations as well as financial institutions have a different approach in taking the trajectory towards the change, this study has designed a digital financial service delivery (DFSD) model that is aligned to the digital banking performance framework. The DFSD model is about the approach that banks use to optimise financial service delivery and customer satisfaction. It comprises seven phases namely growth opportunity, collaboration, design and simulation, implementation and development, digital support and challenge management.

Since all the above elements are applied at the South African banks although not in the same pattern, figure 7.5 below shows compilation of the elements that enable successful delivery of digital financial services.



Source: Own Compilation

Figure 7.5: Digital financial service delivery model

Phase One: growth opportunity

Growth opportunity can be discovered by the bank for positioning or be enforced by the government for economic and financial purposes. During this phase, banks scrutinise the market through analysis and planning of change.

Phase Two: Collaboration

Once the opportunity is found, banks start the collaboration process with all stakeholders to support the project and the potential disruption. This approach helps stakeholders to not develop resistance but to be part of the transformation. In the Collaboration stage, service delivery must own the customer. SA banks 'managers must provide continuous information to the customers to orientate their choice in alignment with the global change.

Phase Three: Design and Simulation

During this phase, banks design a skeleton of the restructuration steps and the impacts on the existing banking transaction's processes. Additionally, amendment on the supply and payments chains is elaborated. They further present the scenarios using sophisticated tools and IT platforms such as financial, management and simulation software. The action plan is therefore documented and approved for execution.

In the Design stage, social acceptance and awareness of digital financial services and not the core of financial knowledge. In the Development phase, affordable fast and unlimited internet connectivity must be available

Phase Four: Implementation and Development

During the implementation phase, the project team is defined and roles and responsibilities are assigned. It happens that at this stage, more applications or system upgrades are needed. IT developers come into the play for new designs or amendment of the core coding system where required. Several tests are done to remain in line with the predefined action plan. The Go-Live is then launched to move to the next stage.

Phase Five: Fully digitalised

In the fully digitalised transformation phase, businesses invested in hardware and bandwidth, collaborative software, access remote databases and participate in virtual meetings in addition to managers experiencing virtual team management: Telework. Reaching this stage shows that

the main goal of becoming a fully digitalised bank is achieved. Customers can therefore rejoice easy banking through complete online transactions and remote connectivity.

Phase Six: Digital support

Although the bank is at his fully digitalised stage, sustainable digital support is still required at both the employee, bank and customer levels to remain competitive. The bank can have an internal support team or subcontract the technical support services. Banks must always be ahead of the change since technological innovations evolve every day.

Phase Seven: Global/National Change (Covid-linked Change)

Observations showed that despite the strong measures put in place by the banks to ensure productivity, global and national change can badly affect performance of banks in a short period of time. Currently in the world, countries such South Africa are experiencing shortfall of bank performance due to the pandemic of the Corona Virus.

In the Covid-linked change phase, more innovations are required from the bank since technical barriers are lowered, international telework is easier through access to talented workers and to workers in low-wage countries.

7.7 Conclusion

Based on research findings and financial data audited by the SARB and published by the South Banks, the study designs a digital banking performance conjunctive framework. The framework includes digital banking performance variables, the digital banking performance types, digital banking challenges, digital system innovations, digital BPR management, digital banking disaster and the digital disaster management model. Since the performance of digital banking increase together with the level of adoption of the technologies of the 4IR, the digital banking performance stages has been designed to guide the trajectory of financial institutions towards the digitalisation process. Additionally, the study conceived a digital financial service delivery (DFSD) model that illustrated phases to follow at each stage of the DBP transformation. The DFSD model contains seven phases such as growth opportunity, collaboration, design and simulation, implementation and development, fully digitalised, digital support and the global/National change.

CHAPTER EIGHT

CONCLUSION AND RECOMMENDATIONS

Introduction

Previous chapters focused on the collection and the statistical analysis of banking performance variables such as digitalisation, business process reengineering and banking performance framework. Discussion and findings revealed detailed information about both banking performance variables and additional banking factors that influence the profitability behaviour of banks. However, some recommendations need to be considered before concluding the current study. This chapter provides the conclusion of the study based on the research questions as well as the related recommendations.

7.1 Conclusion

7.1.1 Answers to the Research Questions

This research utilised both qualitative and quantitative approach to optimise research findings. Effectively, findings from the data analysis were similar to the findings collected from the published bank' annual reports.

Research Question 1

RQ1: To what extend can the digitalisation enhance the digital banking performance in South Africa?

Since the advent of the internet of things (IoT), the world gradually moves to a digital stage whereby connectivity and online are the new individuals and business platforms. The core digital changes are associated with the digital strategies, technological innovations and the customer experience. Digital strategies include transformation of the standard strategies such as the market segmentation, differentiation and the market positioning and digital emerging strategies such as the customer and product-centric, change-driven leadership, security-driven and the data-driven strategies. Digital technologic innovations include the internet of things, smart innovations, Cyber security, smart devices, data analytics, system architecture and the artificial intelligence among others. Digital customer experience highlights the fact that the

digitalisation has promoted the improvement of the customer knowledge through social medias, market competition and the increase of sophisticated digital devices.

Findings showed that 94.17% of the respondents agreed and strongly agreed on the positive impact of digital strategies on the bank performance growth in South Africa. 97.9% of the respondents agreed and strongly agreed on the positive impact of the technologic innovation on the bank performance growth in South Africa. 72.92% of the respondents agreed and strongly agreed on the positive impact of customer experience on the bank performance growth in South Africa.

AQ1: Yes. The digitalisation effectively and significantly enhances digital banking performance in South Africa because findings showed that 93.13% of the respondents agreed and strongly agreed on the positive impact of the digitalisation on the bank performance growth in South Africa. Additionally, correlation analysis showed that there is a strong and positive relationship between the digitalisation and its variables namely the digital banking strategies, the digital technology innovation and the digital customer experience with coefficient respectively .918, .701 and .694.

Research findings further revealed that 26.04%, 26.44% and 11.46% of respondents who respectively have an FNB, Absa and Nedbank account agreed on the importance of defining specific digitalisation mechanisms all aligned to the digital requirements. Although 5.62% of respondents at FNB bank disagree and are not sure of the impact, 9.38%, 14.58% and 5.21% of participants respectively from Nedbank, STD bank and other SA banks strongly agreed on the neceesity to implement digital.

Research Question 2

RQ2: To what extend can the business process reengineering help to evaluate digital bank performance in South Africa?

From globilisation to the industrial revolution, changes transform existing business process known as “As-Is” into reengineered business processes named ‘To-Be” processes using different platforms. Findings based on the literature review shoed that many researchers established the transforming current business processed to be aligned to the change and meeting change requirements. From traditional to reengineered processes, this study highlighted the huge gap between the two levels that individuals and businesses should fill over time. Additionally, this study emphasised on the future reengineered banking process whereby the customer will be designing its own product and services and for the banking to create them.

Ensuring future business survival start today with the understanding of the customer' behavior through behavioral economics, the market and ultimately the financial previsions. Furthermore, legal compliance, bank culture, the use of intelligent machines (robots) as well as the capital and risk management have been restructured.

The current study design more than twenty (20) reengineered banking processes developed by the digital channels, smart technologies and devices. Findings revealed that departments are separated entities that support banking operations in addition to the steering committee that is responsible for the validation of all banking processes to ensure that the mission and vision of the bank is maintained. The rapid and the reengineering of banking processes have an impact on the socioeconomic and the environmental sector. As part of the green requirements, South African banks are compliant to the national and international regulations and laws regarding the eco-friendly environment. SA banks annually submit environmental reports regarding low emissions of CO2, use of renewable energies and the green buildings to protect and preserve a healthy planet for the generations to come.

AQ2: Yes. Business process reengineering effectively and significantly enhance digital banking performance in South Africa because research findings revealed that 79.17% of the respondents agreed and strongly agreed on the importance of reengineering business process to survive the change.

Research findings further revealed that 12.08%, 26.46% and 16.67% of respondents who respectively have an FNB, Absa and Nedbank account agreed on the importance of defining specific digitalisation mechanisms all aligned to the digital requirements. Although 20.83% of respondents at FNB bank are not sure of the impact, 4.17%, 14.58% and 5.21% of participants respectively from Nedbank, STD bank and other SA banks strongly agreed on the neceesity to implement digital BPR.

Research Question 3

RQ3: To what extend can the banking performance framework optimise digital bank performance in South Africa?

From private to public sector, individuals and businesses use predefined framework as guidance for an eventual event. This suggests that people are aware of the benefits of using a roadmap for an unfamiliar journey. In doing so, this study questioned people about the importance of having a predesigned framework for banking performance in South Africa. The

objective of the question was only to have their opinion on the matter since it is for the responsibility of the researcher to define the buildings blocks of the framework.

AQ3: Yes. Banking performance framework effectively and significantly optimise digital banking performance in South Africa because research findings revealed that 68.75% of the respondents agreed and strongly agreed on the use of a digital conceptual framework.

Research findings further found out that 1.67%, 26.46% and 20.83% of respondents who respectively have an FNB, Absa and Nedbank account agree on the importance of defining specific digitalisation mechanisms all aligned to the digital requirements. Although 10.42% of respondents at FNB bank are not sure of the impact, 14.58% and 5.21% of participants respectively from STD bank and other SA banks strongly agreed on the neceesity to implement digital conceptual framework.

7.1.2 Digital Banking Performance

Research findings established that digital banking performance variables have a strong, positive and significant relationship among them because the ccorrelation between DIGBP and DBPRBP, DBCFBP and DBP is respectively 95.10%, 76.60% and 72.50% while the coefficient of significance is .000 at a significance level of 1%. The R square value is .955 meaning that digitalisation, digital BPR and the digital conceptual framework account for 95.5% of the variance of the Digital banking performance in South Africa.

Following the regression analysis coefficients, the regression model can be expressed as follow: DBP= 0.021 + 0.847 DIGBP + 0.209 DBPRBP – 0.070 DCFBP + £

If DIGBP, DBPRBP and DCFBP have a zero value, implementation of the digital banking performance will fail since the value will be zero: The intercept has a positive value. The situation gets even worse if only the slope for digital conceptual framework is considered. In that case, the digital banking performance will dramatically fail with a negative and predicted value of 0.49. This finally suggests that a successful implementation of digital banking performance must include all DBP variables for efficiency purposes.

Based on the biographical profile of respondents, research findings showed the followings:

Age: 1.88% respondents that have less than 18 years old disagreed on the impact of the DIGBP, DBPRBP and the DCFBP on the improvement of the digital performance of SA banks. 2.92% of the 480 respondents were not sure for their response because of the lack of knowledge around the 4IR. On the other side, 10.63%, 31.25% and 26.67% that respectively have between 18-25,

26-35 and 36-45 agreed on the significant impact of digital banking performance variables. Furthermore, 14.58 % of people who have 46 years old and more strongly agreed that the digitalisation, digital BPR and a well-structured digital conceptual framework influence the overall digital banking performance in South Africa.

Gender: 31.46 % of the respondents who strongly agreed that digitalisation and digital BPR as well as a well-structured digital conceptual framework have a great influence on the overall digital bank performance in South Africa are males against 37.08 % of females who agreed and 25.42% that strongly agreed. Evidence showed that the gender variable has become a critical one since the South African government strives for women empowerment.

Research on digital banking performance revealed that efficiency of banks is influenced by both national and international factors. The government together with the SARB define regulations, laws and Acts to be followed by financial institutions for better results over the South African economic.

Race: Findings revealed that 21.04%, 25.00% and 22.50% that are respectively black, white and coloured agreed on the significant impact of digital banking performance variables. Furthermore, 25.00 % of Indian respondents strongly agreed that the digitalisation, digital BPR and a well-structured digital conceptual framework ultimately influence the overall digital banking performance in South Africa.

Education level: Findings revealed that 29.38%, 22.92% and 16.25% of respondents that hold respectively NQF L5, NQF L6, NQF L7 and NQF L8 and more agreed on the significant impact of digital banking performance variables. Furthermore, 4.58 %, 18.75% and 2.08% of respondents that respectively hold NQF L6, NQF L7 and NQF L8 and plus strongly agreed that the digitalisation, digital BPR as well as a well-implemented digital conceptual framework ultimately influence the overall digital banking performance in South Africa.

Job experience: Findings revealed that 12.71%, 20.83%, 27.08% and 7.92% of respondents that respectively have 2, 3, 4 years of experience and more agreed on the significant impact of digital banking performance variables. Furthermore, 15.00 % and 10.42% that respectively 4 years of experience and more strongly agreed that the digitalisation, digital BPR as well as a well-implemented digital conceptual framework eventually influence the overall digital banking performance in South Africa.

Job place: Data collection showed that 16.67% of the respondents work at FNB bank, 14.58% at Absa bank, 16.67% at Nedbank, 10.42% at STD bank and 8.33% work at other SA banks while 6.25% work at the private and public sector, 18.75% are business owners and 8.33% are unemployed. Furthermore, 10.63%, 14.58%, 16.67%, 10.42%, 8.33%, 6.25% and 1.67% that respectively work at FNB bank, Absa Bank, Nedbank, STD bank, other SA banks, private or public and business owners agreed on the interaction and good relationship between digital banking performance variables.

1.88% of participants from FNB bank disagreed on the relationship while 2.92% were not even sure of what to say. However, 17.08% and 8.33% of respondents that are business owners and unemployed people strongly agreed that the digitalisation, the reengineering of BP and a well-organised digital conceptual framework strongly impact digital bank performance in South Africa.

SA bank account: Over the chosen sample of 480 respondents, 158, 127, 100, 70 and 25 respectively hold bank account at FNB, Absa, Nedbank, Standard bank and at other SA banks as indicated in the crosstab analysis. 26.88%, 26.46% and 15.21% of respondents that respectively have FNB bank, Absa bank and Nedbank agreed on the impact of the DIGBP, DBPRBP and the DCFBP on the enhancement of the digital banking performance of SA banks. 2.92% of the 480 respondents were not sure for their response because of the lack of knowledge around the digitalisation. However, 5.63%, 14.58% and 5.21% of the participants that respectively have a Nedbank, STD bank and other SA banks agreed and strongly agreed.

Customer satisfaction: Findings shows that 88% of respondents approved that customer service delivery is at the point in all South African banks. Although 86% of the respondents argued that Bank' staff are not always qualified, and some banking processes still require going to the bank, the overall outcomes is substantial. It shows that 14.17%, 26.46% and 6.25% of respondents that respectively have FNB bank, Absa bank and Nedbank account agreed on the importance of the digital customer index in improving digital banking performance in South Africa. 8.33% and 6.25% of respondents that have an account at FNB bank respectively strongly disagreed and disagreed on the critical impact of knowing what improves digital customer satisfaction. Moreover, 4.17% of respondents from FNB bank were not sure of the right response due to some limitations. However, 14.58%, 14.58% and 5.21% of the 480 respondents that have bank account at respectively Nedbank, STD bank and other SA banks

strongly agreed on the significant role of the digital customer satisfaction index in the process of implementing a successful digital banking performance in South Africa.

As financial entities, South African banks build digital strategies, technologic innovations and customer experience to meet requirements enforced by the digitalisation. Research findings specified that the overall banking performance includes financial, strategic, digital, socioeconomic, risk and capital and environmental performance. Digital financial performance was assessed using financial ratios such as Return on Equity (ROE), Return on Assets (ROA), cost-to-income, credit loss and the total adequacy ratios. Findings revealed that South African banks have a good financial health. Each year SA banks published their well-structured governance that enables well-organised and successful strategic performance. Continuous customer satisfaction tells about the good strategic approach Given the volume of digital channels namely online and cellphone banking, Bank App among others, the number of customers using the Bank App among others. Socioeconomic performance revealed that South African banks contribute for the social inclusion, women empowerment, B-BBEE requirements and community education. SA banks also spend millions for youth education ensure employee development through continuous training and upskilling. Following the Basel III requirements, SA banks have been maintaining a minimum capital of 12% to avoid financial and capital risks as prescribed by the SARB. Findings revealed that SA banks have a good environmental performance because they are compliant the sustainable development goals set by the United Nations, energy consumption, carbon footprint and the green buildings. Although SA banks make efforts to be ahead of the technology while following the digital trajectory, they are affected by local and global challenges such as the rise of Fintech technology, the oversight regulations and compliances, dependence to the internet providers and the intelligent machines compromising the supremacy of the humankind.

The study added a section about digital comparison analysis between SA banks from 2017 to 2018. Research findings established that from 2017 to 2018, FNB was leader in the financial sector with a highest return on equity (ROE) and a highest return on assets (ROA) compared to other banks. Standard bank rises to become a leader while comparing headline earnings. Comparison between volumes of assets revealed that Standard bank is the leader with the highest volume of assets. Following the cost-to-income ratio, results showed that Standard bank and Nedbank both led the market compared to FNB and Absa that were the followers. Using credit loss ratio, results showed that Standard bank led the market then comes Nedbank, FNB and lastly Absa. According to the capital adequacy ratio, FNB is the leader because its

CAD is slightly higher than the minimum of 12% compared to Nedbank and standard bank that have a very high ratio. It is not advisable for banks to hold too much capital sitting in the books because money can be invested to increase credit interests. In March 2020, the President of the republic of South Africa, Cyril Ramaphosa declared the national disaster and lockdown caused by the Corona virus. Consequently, SA bank' shares lost value in the financial market leading to the decrease of economic growth.

7.1.3 Digital Banking Performance Models

Based on research findings and financial data audited by the SARB and published by the South Banks, the study designs a digital banking performance conjunctive framework. The framework includes digital banking performance variables, the digital banking performance types, digital banking challenges, digital system innovations, digital BPR management, digital banking disaster and the digital disaster management model. Since the performance of digital banking increase together with the level of adoption of the technologies of the 4IR, the digital banking performance stages has been designed to guide the trajectory of financial institutions towards the digitalisation process. Additionally, the study conceived a digital financial service delivery (DFSD) model that illustrated phases to follow at each stage of the DBP transformation. The DFSD model contains seven phases such as growth opportunity, collaboration, design and simulation, implementation and development, fully digitalised, digital support and the global/National change.

7.2 Recommendations

The current research has recommendations regarding needs for further researches.

7.2.1 Area for Future Research

The following recommendations should be taken into consideration for future researches.

In addition to using quantitative and qualitative research approach, future researches can use other research methods and techniques to optimise research findings. They can equally include all South African banks in the study. Before defining research timeframe, researchers should consider the fact that the certified annual reports of banks are published after at least a year. This implies that research period should be at least one year before the period of start of the research. The efficiency of digital researches is questionable because banking financial data are not published every year with consistency. For instance, the volume of customers using Bank' App are released in year 1 but not the following year.

7.2.2 Needs for South African banks/Policy makers

South African banks should alleviate the complex processes related to conducting research inside the banks. Besides developing incredible digital banking strategies, banks' leaders you be convinced of the positive outcomes and not adopting change as digital followers. Since banks are constantly chasing new technological innovations to be ahead of the competition, they must consider the level of the customers. Digital customers can be too demanding but it up to the bank to orientate the change process while embedding clients' expectations. Given the target of becoming fully digitalised banks, digital banking processes should not start online and be completed at the bank.

The governance structure should be very well-managed and controlled considering the strategies of data-driven and security-driven culture developed by banks. Banks' staff are not always experienced in advising the customer and/or in completing customer service delivery in the timely manner. Customers are limited in terms of the financial management of their assets at the bank. Banks should provide financial advisors for all customers in the objective of maximising financial returns. Bank training programmes should be rotative since the employee turnover happens recurrently.

Although banks are compliant to the environmental protection and are enforced to submit related reports to the designated authority, the revolution itself is so fast that human resources are threatened. Consequently, the creation speed of intelligent machines is higher than the adaptation level to the digital change. Digital ethics have not been part of the race to modern world because of an unbalanced environment. Digital integrity deal with ethical considerations in the field of information and communication transformation and the impact on people moral and lives. Observations showed that no one cares about negative impact of rapid change and complex digital world on human being. Disclosure of human privacy, machine learning, and the robotisation negatively affect human's life. The government remains the las guardian of the safety and protection of the human supremacy above all changes and revolutions.

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ANNEXURES

ANNEXURE 1

Letter of Consent

Dear Respondent,

You are invited to complete survey questionnaire that forms part of my Doctorate studies at the University of Johannesburg. This questionnaire aims at collecting information for a research study on "Digitalisation and business process reengineering for bank performance: A perspective of South African banks".

Please note, this questionnaire is adapted from Sadikoglu and Olcay (2014) and adjusted to suit this present study. The questionnaire seeks for assessing the level to which the digitalisation by means of 4IR and the reengineering of banking processes can improve South African bank performance.

Please take note of the followings:

- Your decision to take part is entirely voluntary.
- Your name is not required, and the confidentiality is guaranteed.
- Your response will remain confidential and anonymous.
- The questionnaire will only take 10-15 minutes of your time.
- You can email me the answers or agree for an interview.
- Instructions are given in each of the below sections.
- Answer all questions.

Your cooperation will be much appreciated.

Thank you

ANNEXURE 2 : QUESTIONNAIRE

PART ONE : BIBLIOGRAPHY

Answer every question by ticking (√) on the appropriate box from 1 to 5. Number between 1 and 5 to indicate your opinion on the statements made for each aspect of the bibliography as follow.

1.What is your age in years?

Less Than 18	1	
18-25	2	
26-35	3	
36-45	4	
46 and Plus	5	

2. What is your gender?

Male	1	
Female	2	
Others	3	

3. What is your Race?

Black	1
White	2
Coloured	3
Indian	4
Other	5

4. What is your level of education?

Less Than NQL5	1
NQF Level 5	2
NQF Level 6	3

NQF Level 7	4
NQF Level 8 or More	5

5. What is your job experience level?

< one year	1
Two years	2
Three years	3
Four years	4
Four years and more	5

6. Where do you work?

FNB Bank	1
Absa Bank	2
Nedbank	3
Standard Bank	4
Other banks	5
Private or Public Sector	6
Business Owner	8
Unemployed	9

7. What is your bank?

FNB Bank	1
Absa Bank	2
Nedbank	3
Standard Bank	4
Other banks	5

PART TWO: DIGITALISATION

Part one of the questionnaire is about digitalisation that includes digital business strategies, technological innovation and customer experience. Please indicate your opinion by placing a cross (x) in your selected response.

SECTION A: Digital Business Strategies (DBS)

Digital strategies applied at my bank		**Strongly Disagree (1)**	**Disagree (2)**	**Not Sure (3)**	**Agree (4)**	**Strongly Agree (5)**
DSB1	Differentiation					
DBS2	Market segmentation and positioning					
DBS3	Customer and product-centric					
DBS4	Change-driven leadership					
DBS5	Security-driven strategy					
DBS6	Data-driven strategy					
DIGDBS	Effective and efficient business strategies contribute to the improvement of bank performance					

SECTION B: Digital Technological Innovation (DTI)

Financial products that my bank offers		**Strongly Disagree (1)**	**Disagree (2)**	**Not Sure (3)**	**Agree (4)**	**Strongly Agree (5)**
DTI1	Internet of Things					
DTI2	Smart Innovations					
DTI3	Smart Devices					
DTI4	Data Analytics					
DTI5	Artificial Intelligence					
DTI6	Digital Banking Channels					
DTI7	Banking security measures					
DTI8	Cyber Security					
DTI9	Cloud Architecture					
DTI10	Green Innovations					
DIGDTI	DTI improves bank performance					

SECTION C: Digital Customer Experience (DCE)

My bank cares about customer experience		Strongly Disagree (1)	Disagree (2)	Not Sure (3)	Agree (4)	Strongly Agree (5)
DCE1	Improvement of the Communication and Banking Channels					
DCE2	Manage demanding customers					
DCE3	Customers 'education and upgrade					
DCE4	Help customers through digital transformation					
DIGDCE	Efficient Digital Customer Experience improves digitalisation					

PART THREE: BUSINESS PROCESS REENGINEERING

SECTION D: Digital Business Process Reengineering (DBPR)

These bank products have reengineered banking transaction processes		Strongly Disagree (1)	Disagree (2)	Not Sure (3)	Agree (4)	Strongly Agree (5)
DBPR1	Banking omni-channels					
DBPR2	Process Change Management					
DBPR3	Payment Terminals/Businesses					
DBPRBP	Digital BPR					

PART FOUR: BANKING FRAMEWORK

SECTION E: Digital Conceptual Framework (DCF)

Digital Banking Framework should contain the following		Strongly Disagree (1)	Disagree (2)	Not Sure (3)	Agree (4)	Strongly Agree (5)
DCF1	Digital Banking Strategies, Technology Innovations and Customer Experience					
DCF2	Digital Business Process Reengineering					
DCF3	IT Project Management					
DCF4	System of Systems reengineering/Integration					
DCF5	Knowledge-Based Management/ Emotional Intelligence					
DCF6	Employee and Stakeholders' Development					
DCF7	Compliance to Laws, Regulations and Acts					
DCF8	Compliance to the Socioeconomic and Environmental Requirements					
DCF9	Compliance to the global and Sustainable Development requirements					
DCF10	Management of Digital Challenges/Macro & Micro					

DCFBP	Digital Conceptual Framework					

PART FOUR: DIGITAL CUSTOMER SATISFACTION

SECTION F: Digital Customer Satisfaction (DCS)

The following statements tell about customer satisfaction		**Strongly Disagree (1)**	**Disagree (2)**	**Not Sure (3)**	**Agree (4)**	**Strongly Agree (5)**
DCS1	Digital banking processes are well-structured and time efficient					
DCS2	SA Banks care about Socioeconomic and environmental needs					
DCS3	Banking Omni-Channels are fast, useful and efficient					
DCS4	Bank products/Services delivery are adequate					
	Bank systems are easily accessible					
DCS5	Some banking processes still require going to the bank					
DCS6	Security levels still required perfection					
DCS7	Processes are different in between branches of the same bank (Database)					
DCS8	Bank 'Staff are not always qualified					
DCS9	Customers are treated fairly/Interest rate/Bank charges					
DCS10	Fulfilment of promises made to customers					
DCS11	Supporting customer education/ financial literacy					
DCS12	Constant run of customer satisfaction index survey					

THANK YOU FOR YOUR TIME AND PARTTICIPATION!!!

ANNAXURE 3

DIGITAL TRANSFORMATION

List of Intelligent Machines (Artificial Intelligence)

Description	Areas
Google' s AI-Powered Predictions	Research
AI Autopilot	Transport
Spam filters	Security
Smart Email categorisation	Communication
Robot-readers	Technology
Tesla smartphones and auto mobile	Technology
Mobile Check Deposits	Banking
Siri and Cortana (which are voice activated assistants)	Technology
Manufacturing robots	Manufacturing
Automated financial investing	Finances
Social media monitoring	Security
Netflix	Entertainment
Flying drones	Technology
Smart assistants	Technology
Online banking	Technology
Disease mapping	Technology

Source: Accenture (2018)

List of Daily digital Use

Description	Areas
Automatic Parking	Parking
Cashier machines	Payments
Electric fridges and washing machines	Appliances
Electronic books (e-books)	Academy
Electronic Commerce	Commerce
Emails	Communication
GPS	Geography
Online learning	Education
Online Shopping	Shopping
PayPal and electronic bills	Payments
Social media sites	Communication
Uber	Transport
Using MP3 files	Music

Source: Siemens (2017) (2020)

Top 10 digitalised companies in South Africa

Number	Companies
Best Digital agencies	HB WEB
	Electro Web Design
	Jellyfish Online Marketing
	Titan Digital
Digital marketing agencies	BlueMagnet
	Spitfire Inbound
	Web SEO Online
	Storyteller
	Akio Agency

Source: Deloitte (2015)

Top fully digitalised companies in the world

COMPANY	COUNTRY	INDUSTRY
Alibaba	China	Internet and catalogue retail
Alphabet	USA	Computer services
Amazon	USA	Internet and catalogue retail
Apple	USA	Computer hardware
AT&T	USA	Telecommunication services
China mobile	Hong Kong	Telecommunication services
Facebook	USA	Computer Services
IBM	USA	Computer Services
Intel	USA	Semiconductors
Microsoft	USA	Software and programming
Samsung electronics	USA	Semiconductors
SoftBank	Japan	Telecommunications services
Verizon communications	USA	Telecommunications services
Walt Disney	USA	Broadcasting & Cable

Source: PWC (2017)